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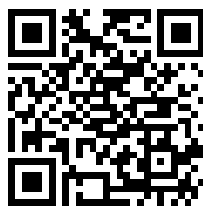
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SOCIETY FOR THE ENCOURAGEMENT OF  
ARTS, MANUFACTURES, & COMMERCE.

INTERNATIONAL CONGRESS  
ON  
TECHNICAL EDUCATION.

*REPORT of the PROCEEDINGS of the FOURTH MEETING.*

*Held in LONDON, JUNE, 1897.*

LONDON:  
PRINTED BY WILLIAM TROUNCE, 10, GOUGH SQUARE, FLEET STREET, E.C.  
1897.

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**SOCIETY OF ARTS,  
JOHN STREET, ADELPHI,  
LONDON. W. C.**

*With the Secretary's Compliments.*









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# INTERNATIONAL CONGRESS ON TECHNICAL EDUCATION.

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On the 23rd of December, 1896, a proposition was submitted to the Council of the Society of Arts by Sir John Donnelly, the Secretary of the Science and Art Department, that the Society should invite the Congrès International de l'Enseignement Technique to hold a meeting in London in June, 1897. It appeared the Congress had held three previous meetings—one at Bordeaux in 1886, one at Paris in 1889, and one at Bordeaux in 1895. It had been proposed to have held the meeting for the present year at Madrid, but the arrangements for so doing had fallen through, and a desire had been expressed that the Congress should meet in London. Sir John Donnelly further informed the Council that he had reason to believe that the proposition for holding a meeting in London would be favourably regarded by the Education Department, although it would be contrary to the usual practice that an official invitation for such a meeting should be issued by Her Majesty's Government. Sir John Donnelly further suggested that some of the City Companies should be invited to co-operate with the Society.

The Council appointed a small Committee to consider and report on the subject, and the Chairman was requested to ascertain the views of His Royal Highness the President. Steps were taken by this Committee to ascertain the views of the City Companies, and sufficient encouragement having been received from them, the Committee reported on the 1st of February to the Council recommending that an invitation should be addressed to the President of the Congress, inviting the Congress to hold their meeting in London on the 15th to the 18th of June. The Chairman also reported that His Royal Highness the President approved of the proposal that the Society of Arts should invite the Congress. The date suggested was adopted in consequence of an expression of opinion from the Permanent Committee of the Congress, that it would be desirable to hold the meeting at a time when the educational institutions of the country where the meeting was held were not in recess.

It was further resolved that so soon as the invitation had been accepted an application should be addressed to the Foreign Office, asking that Foreign Governments might be invited to nominate delegates to the Congress, and also that the invitation should be extended to the Colonies and India.

On the invitation of the Council, the Duke of Devonshire accepted the office of President of the Congress, and Sir John Gorst that of Vice-President; M. Saignat was also nominated as a Vice-President. Major-General Sir Owen Tudor Burne, G.C.I.E., Chairman of the Council, was appointed Chairman of the Congress, and the Masters of the contributing City Companies Vice-Chairmen. The Council also appointed a General, an Executive, and a Reception Committee. Sir Henry Trueman Wood, Secretary of the Society of Arts, was appointed General Secretary of the Congress. A list of these committees is given on page 295.

On March the 4th, Monsieur Saignat, the President of the Congress, wrote accepting the invitation to meet in London. In anticipation of the acceptance of the invitation, the Executive Committee had already held its first meeting (22nd of February), and had commenced the organisation of the Congress. As the result of the application to the City Companies, promises of support were received from the following nine companies:—The Mercers, Drapers, Fishmongers, Goldsmiths, Merchant Taylors, Vintners, Clothworkers, Leather-sellers, and Carpenters.\* The Lord Mayor, whose influence was sought on behalf of the Congress, promised to support it, and he kindly gave an evening reception to its members during the meeting.†

The Foreign Office acceded to the application that foreign Governments might be invited, and an application was sent to foreign Governments requesting them to appoint such

\* A list of the amounts contributed by these companies will be found on page 306.

† The reception was held at the Mansion-house, on Thursday, 17th June,

delegates. The shortness of the notice prevented many of the Governments from accepting the invitation, but eventually the following delegates were nominated:—Mr. C. V. Brooks, by the United States of America; Mons. Eugène Rombaut, Dr. O. Pyfferoen, and Mons. Paul Wauters, by Belgium; Mons. Felix Martel and Mons. P. Jacquemart, by France; Mons. Boris Ovsianikoff and Mons. Gregory Wilenskin, by Russia.

In addition to a formal application to the Colonial and Indian Offices, asking that representatives from India and the Colonies might be appointed, application was also made to the Colonial Agents - General in London, asking if they would obtain communications on the subject of Technical Education in their respective colonies for the information of the Congress. Here, also, the notice was very short; but in many cases it happened that the information could be supplied without communication with the local authorities, and a number of valuable communications were received.

A subscription of 5s. was charged for membership of the Congress, members of the Society of Arts and Liverymen of the contributing companies being admitted free.\*

Programmes of the Congress (in English, French, and German) were issued to the principal Technical Institutions in this country and abroad, to the County Councils and County Borough Councils, to the Science and Arts Classes, &c.

The Congress was opened at 11 o'clock on the 15th of June by an Address from the President, the Duke of Devonshire, K.G., and from

the President of the last Congress, Monsieur le Professeur Léo Saignat. It was found necessary to divide the Congress into two sections, A and B. The meetings of A were held in the Society of Arts' Room, those of B in the Lecture Theatre of the London School of Economics, which had kindly placed the theatre at the disposal of the Congress. The meetings were held from the 15th to the 18th of June, inclusive, a morning and afternoon sitting being held on each day. The meetings were presided over by the Duke of Devonshire, the Right Hon. Sir John Gorst, Monsieur Léo Saignat, Major-General Sir Owen Tudor Burne, Major-General Sir John Donnelly, Right Hon. A. J. Mundella, M.P., Mr. John Walter Sugg, Mr. William Bousfield, Mr. William Woodall, M.P., Lord Belhaven and Stenton, Sir Steuart Colvin Bayley, and Sir Owen Roberts.

In all, 56 communications were laid before the Congress. The subjects related to technical education and commercial education generally, technical education in its bearing on special trades, the technical education of women, technical education in India, and technical education in the colonies. The papers were all printed beforehand, and distributed at the meeting, for the purpose of facilitating discussion.

At the concluding meeting a permanent bureau was elected for the purpose of carrying on the work of the Congress in the interval between its meetings. The names of the members will be found on p. 307.

It was also determined that the Central Office of the Congress should be in Paris.

HENRY TRUEMAN WOOD,  
*Secretary.*

\* A list of the members, delegates, and others taking part in the Congress is given on p. 299.

# REPORT OF PROCEEDINGS.

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The Opening Meeting of the Fourth Session of the Congrès International de l'Enseignement Technique was held in the rooms of the Society of Arts, on Tuesday, 15th June, 1897.

Sir OWEN TUDOR BURNE, G.C.I.E., K.C.S.I., Chairman of the Council, introduced M. le Professeur LEO SAIGNAT, President at the last Congress at Bordeaux, who took the chair and addressed the meeting as follows:—

Mesdames et Messieurs,

Je suis heureux de voir s'ouvrir à Londres le quatrième Congrès International de l'Enseignement technique, commercial et industriel, et je suis très honoré d'être appelé, comme Président du Congrès précédent, à souhaiter la bienvenue à l'illustre Président du Congrès actuel, Monsieur le Duc de Devonshire, Lord Président du Conseil. Je regrette seulement de ne pouvoir m'exprimer en anglais. La réunion du Congrès dans la capitale de l'Angleterre réalise un vœu que j'exprimais en 1895 lorsque j'ouvrais à Bordeaux le troisième Congrès. Les trois premiers Congrès avaient eu lieu en France; le premier à Bordeaux, le deuxième à Paris, et le troisième à Bordeaux. En constatant les heureux résultats de ces trois Congrès non-seulement pour la France, mais aussi pour d'autres pays où une vive impulsion avait été donnée à la création d'écoles spéciales pour le commerce et l'industrie, j'ajoutais: "Il ne faut point perdre de vue que nos Congrès sont "internationaux et qu'ils doivent garder ce caractère "pour conserver toute leur utilité. Si les Congrès se "réunissaient toujours dans le même pays on pourrait "craindre que l'uniformité amenât la lassitude et que "l'on se rendît moins nombreux dans les Congrès, "qui perdraient ainsi une partie de leur autorité. Il "est donc désirable que des Congrès semblables se "réunissent dans d'autres pays." Ce vœu est aujourd'hui réalisé par l'Angleterre. Aucun pays ne pouvait offrir au Congrès un plus beau champ d'études; aucun ne se distingue par une plus grande activité commerciale et industrielle, par une intelligence des affaires plus puissante et plus féconde. Nul pays n'est plus à l'affût des progrès de la science et ne sait en tirer plus rapidement d'importantes utilités. La Société des Arts était elle-même bien placée pour continuer l'œuvre commencée à Bordeaux par la Société Philomathique, et je lui suis reconnaissant d'avoir bien voulu s'y prêter. Le Congrès qu'elle a organisé avec le concours de plusieurs corporations de cette grande

citée, marquera sa place dans les annales de l'Enseignement commercial et industriel. La liste des hommes distingués qui se sont fait inscrire pour y faire des communications en est un sûr garant. Je suis heureux d'y voir les noms des deux représentants de l'Angleterre aux deux Congrès de Bordeaux, Sir Philip Magnus, et Monsieur Gilbert Redgrave. Les illustres personnalités que vous avez placées à la tête du Congrès le Lord Président du Conseil, Monsieur le Duc de Devonshire, Sir John Gorst, Vice-Président du Conseil, et le Major-Général Sir Owen Tudor Burne attestent l'intérêt que l'on porte dans ce pays aux œuvres du travail. L'enseignement technique est avant tout une œuvre du travail. Il tend à rendre plus facile et plus fructueux le travail de ceux qui se destinent au commerce et à l'industrie, en mettant à leur disposition les découvertes incessantes de la science qui jettent chaque jour dans le monde des éléments nouveaux de production et offrent à l'activité humaine des procédés nouveaux, réduisant à l'impuissance et à la stérilité les efforts de ceux qui ne se mettraient pas au courant des découvertes nouvelles. A notre époque, où le travail est le principal ressort du succès et de la vie, tout ce que l'on fait pour le rendre plus facile et plus fructueux est une œuvre de bien public. Dans le temps actuel où les luttes des classes sont si vivement engagées, où des passions mal raisonnées tendent à oblitérer le principe de la solidarité humaine, où beaucoup croient voir des oppositions d'intérêts là où il y a au contraire concours mutuel à une utilité commune, il est méritoire de chercher à éclairer le travailleur à lui rendre le travail plus facile et par suite moins pénible, et en l'y préparant par de solides études à lui éviter les déceptions et le découragement que causent les efforts infructueux. Mais je ne veux point Messieurs anticiper sur le Congrès. Je laisse à une voix plus autorisée que la mienne le soin d'en tracer les grandes lignes, et j'ai hâte de lui céder la parole. Le Lord Président du Conseil apportera au Congrès dont il a accepté la présidence l'autorité de sa haute situation personnelle et de l'approbation du Gouvernement dont il fait partie. En acceptant la présidence de ce Congrès, il a manifesté son amour du bien public et mérité la reconnaissance des travailleurs de tous les degrés et de tous les pays. Permettez-moi Messieurs en terminant d'adresser un respectueux hommage à Sa Majesté la Reine, dont le long règne que la reconnaissance nationale célébrera dans quelques jours par des fêtes mémorables, a si puissamment contribué à la prospérité toujours croissante de ce pays.

The Duke of DEVONSHIRE, K.G., then took the chair, and addressed the meeting. He said :—

It is in a double capacity that I have the honour of offering a welcome to the International Congress on Technical Education. We have in this country a Department of Education, but its functions are almost entirely limited to elementary education, and we have not in our administration any Minister who properly corresponds to the Minister of Education of other Governments. Nevertheless, the President of the Council is the Minister on whom the nearest approach to responsibility for education rests, and the Vice-President, Sir John Gorst, is the Minister who, representing as he does the Government on education matters in the House of Commons, shares with the President a large part of his responsibility. It is, therefore, partly in our official capacities that Sir John Gorst and I are taking part in these proceedings. But the comparatively unorganised condition of education as a whole has led to the formation of various unofficial and irresponsible associations with the object of promoting and helping to organise special branches of education to meet the growing needs of the country. Of these, the National Association for the Promotion of Technical Education is one in the establishment of which I, though no educational expert, have taken some part, and of which I am still President. I shall have a few words to say on a part of the work which has been done by this Association, before I conclude, but I refer to it now as explaining my presence on this occasion. It is due, however, to the public spirit, and to the active assistance of another of those voluntary associations to which I have referred, that it has been made possible to hold in London, this, the fourth meeting of the International Congress on Technical Education. Founded more than 100 years ago (in 1754), and incorporated by Royal Charter 50 years since (in 1847), the Society of Arts has, with a varying measure of success, and with varying public recognition and support, been engaged in many different directions in the encouragement of the arts, manufactures, and commerce of the country. By the discussions which it encouraged, by its publications, by the competitions which its prizes stimulated, it has done much for each of these objects, and to create in the country a recognition of the practical value, as well as of the scientific and artistic interest, of the application to business of science and art. Without directly undertaking the work of teaching, it took a leading part in bringing about the International Exhibition of 1851, the parent of innumerable other international exhibitions, which have, perhaps, given a greater impetus to scientific, artistic, and technical, and even elementary education, than anything else. And it is directly to the Society of Arts that the meeting of this Congress in London is due. When it was suggested that the next meeting in succession to those which had been held uniformly in France should be held in Great

Britain, the Government, through the Science and Art Department, regretted that it was impossible for them to issue invitations. The Society of Arts took up the matter on the condition that the Government would give it such recognition as they could, and this has been offered by the semi-official help rendered by the Foreign Office, and by the presence, whatever it may be worth, of myself to-day. But another difficulty remained. The Society of Arts did not command funds which would have met the necessary expense of the Congress, and the Government had no funds which could be placed at their disposal. The difficulty has been solved by the generosity of the City Companies, who, not for the first time, but in addition to splendid assistance in other directions, have proved the strong sense which they entertain of the value to industry and to commerce of an extended scientific, artistic and technical education, and have guaranteed the needful expenditure. The City Companies to whom we are indebted, and to whom I desire, in the name of the Conference, to tender our hearty thanks, are the Mercers, Fishmongers, Drapers, Goldsmiths, Merchant Taylors, Vintners, Clothworkers, Leathersellers, and Carpenters. Turning to the business of the Congress, its previous assemblies have done much to increase public interest in the very important question of technical instruction; and the well-arranged and representative programme of the present Assembly, justifies the hope that its deliberations on the present occasion will be no less fruitful than in the past. In the history of more than one grade of English education, public conferences held at suitable times have been highly beneficial to the public interest. They bring the leaders of the education world into personal contact with one another and promote the useful interchange of opinions and experience. The reports of the discussions in the newspapers and the subsequent publication of their proceedings deeply influence public opinion and help to guide the policy of Parliament and of the administrative Departments of State. The present time is well-chosen for an international congress on technical instruction. In all countries there are signs of increasing interest in foreign methods of education. Systems of education, indeed, cannot be transferred ready made from one country to another. Education is a thing too closely interwoven with national life and habits to permit any such easy transference. A national system of education grows up in natural adaptation to the peculiarities of national character and owes its chief virtues to the fact that it fits the habits of thought and the political conditions of the country which it serves. But, when every allowance has been made for this, it remains true that each country can learn very much from the experience and the educational organisation of other countries. Educational ideas and ideals may be communicated, although systems of administration cannot be transferred without great modification and adjustment to special circumstances. We find, there-



fore, that in point of fact, English education has been materially affected during the last sixty years by a succession of waves of foreign influence coming in succession from France, Holland, Germany, Switzerland, America, and Scandinavia. And, in some respects, there is no department of education in which methods of teaching and plans of organisation can be more readily transferred from one country to another than is the case in technical instruction, which is the subject of the present Congress. In many respects, this country has been the debtor in this long process of foreign educational exchange. But there is one point at least in which continental critics are now paying Great Britain the compliment of careful study and even of admiration. The need for individual initiative and for freedom of local experiment has always been fully recognised in English education, and in no grade of it has this been more the case than in technical instruction. We have recently been working out an interesting and fruitful experiment in combining financial aid from the central exchequer with great liberty of action and experiment on the part of the County and County Borough Councils. The policy of the Government in 1890, in permitting local authorities to expend their share of the residue of the excise duties on technical education has probably done more than any previous act of the State to stimulate national interest in technical instruction, and, indirectly, in other forms of education also. While the central Government, through its administrative departments, has not failed to give a certain measure of guidance to the new movement, it has thrown the greater part of the responsibility on the local authorities, believing that (in technical education especially) there must be great elasticity in administration, and incessant adaptation of the means and form of instruction, in order to meet the great variety of the industrial and commercial needs, which exist in the different localities but can only be ascertained and fully tested by local experiment. The local authorities have, with few exceptions, risen to their new responsibilities with an alacrity and enterprise which deserve high commendation. But they have also felt their own inexperience, and have not only taken counsel with one another but have sought the advice of persons qualified to advise them. They have thus, I hope, derived much assistance from the National Association for Promoting Technical and Secondary Education, to which I have already referred, and to which Mr. Mundella, Mr. Arthur Acland, Sir Henry Roscoe, Mr. Llewellyn Smith, and many others have rendered distinguished service. It is characteristic of England that a society, formed by private initiative but embracing in its membership a large number of men holding public positions, should have rendered this important service at a critical stage in the history of our educational development. Equally notable is the fact that so many of the ancient City Companies should now be reviving, in a manner fitted to the changed conditions of modern life, their old conditions of commercial and industrial

usefulness. All of those who are labouring for the extension and improvement of technical instruction in Great Britain—as well as in Ireland, where a remarkable movement is now in progress for the furtherance of technical education—will learn much from the reports brought by the foreign delegates. They will also take special interest in the accounts to be given by distinguished visitors of technical education in Canada, in India, and in Australasia. To British hearers, probably, no part of the discussions will be more instructive than that which is to be devoted to the subject of commercial education. In the field of higher commercial education, Great Britain is believed by many competent observers to be seriously behind several of the Continental nations. The reputation of the French schools of commerce stands deservedly high, and the Congress is to be congratulated on the prospect of hearing, from so eminent an authority as M. Jaques Siegfried of Paris, and M. Saignat, the late President of the Congress, an account of higher commercial education in France. Attention will also be usefully directed to the influence of the Realschulen of Germany and especially the Realschulen of Berlin, in producing, by means of a carefully planned modern secondary education, given by trained teachers of the highest attainments, an increasing number of youths eminently fitted to profit by the highest kinds of technical education and to promote the commercial interests of their country. The present Congress is held at a time specially interesting to all the English speaking world. The long reign of Her Majesty has practically coincided with a great series of efforts, public and private alike, to build up a national system of education in this country. The work is far from completed. We are now on the threshold of a period which promises to be full of educational activity and re-organisation. It is of happy augury that it opens with a Congress at which the representatives of many nations will meet together in friendly debate on subjects which are of deep moment to all alike.

As the Duke of Devonshire was compelled to leave the meeting, General Sir OWEN TUDOR BURNE took the chair. He then proposed a vote of thanks to his Grace for having shown the sympathy of the Government with their Congress by his opening it with so interesting an address. The motion was seconded by M. JACQUEMART, and unanimously agreed to, and his Grace briefly acknowledged the compliment.

Sir OWEN BURNE said that he had very little to add to the admirable addresses just delivered by Mons. Leo Saignat and the Duke of Devonshire. He would like to remind the meeting, however, of certain details connected with the Congress, and these he described in extenso. He remarked that education was the source of happiness to every human being, and to those

with whom each individual came in contact ; it must be remembered, nevertheless, that education could only be complete when practical knowledge was added to that which was theoretical, and this he understood to be the object of the Congress. He wished to add that it gave the Society of Arts and the City Companies very great pleasure to give a hearty welcome to the Congress now assembled, and to say how gratified they were to receive so many distinguished Foreign Delegates who had taken the trouble to come to London to attend it. Then turning to Mons. Saignat he said in French :—

Je vous prie, M. Saignat, d'accepter de la part de la Société des Arts, et des City Companies, comme aussi de la mienne, l'assurance que cela nous fait le plus vif plaisir d'avoir l'honneur de vous recevoir à ce Congrès—vous et vos distingués confrères. J'espère bien que vous trouverez nos discussions intéressantes et instructives ; et, surtout, que vous emporterez à votre départ un bon souvenir de votre séjour en Angleterre.

The CHAIRMAN then proposed a vote of thanks to M. Saignat for his address, and to the foreign delegates generally for their attendance.

Sir DOUGLAS GALTON, K.C.B., F.R.S., seconded the resolution, which was carried.

M. SAIGNAT, replying in French, said that he keenly regretted his inability to address them in their own language. He had, however, understood a little of what had just been said, and the little he had understood, enabled him to know that they had overwhelmed him with thanks. He and his colleagues were extremely sensible of all the kindness which they had received. It was with them a privilege and a pleasure to be able to come amongst the *savants* of London, and especially to be so cordially received by them. They had been in London as yet but a short time, but nevertheless they had been touched by the manner in which they had been generously received with open arms, and he thanked them all very much.

M. LÉONARD SUTTLE, of Bordeaux wished to say a few words. There was in Paris a society called the "French and English Association," and its annual meeting took place on May 21st last, the English Ambassador and Lady Monson, and the French

Minister of Public Instruction being present. The object of the Association was to bind more closely together the ties between the two countries, and he was deputed by the Philomathic Society of Bordeaux to say that they were animated by the same cordial sentiments. They were particularly pleased when they read the programme of the present Congress, with its long list of distinguished members of English Society and the English nobility, for it showed that they were in reality a true and genuine nobility, to interest themselves in the proceedings of such a Congress. On the part of his Society he wished long life to her Majesty the Queen, to the noble President, and the Members of the Congress.

The reading of the papers was then commenced.

#### THE RELATIONS EXISTING BETWEEN THE TEACHING OF PURE CHEMISTRY AND APPLIED CHEMISTRY.

By OTTO N. WITT, Ph.D.,

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It is a well-known and universally admitted fact that no branch of industrial enterprise has met, during the latter half of our century, with such signal and varied success as chemical industry. New manufactures, based on chemical principles, have been created and developed to colossal importance ; branches of chemical science, considered to intricate and special even to be mentioned in the ordinary text-books of chemistry, have become the foundations of new manufactures ; substances which in former times have been known as troublesome refuse have proved a more potent source of national welfare than even the richest gold-mines.

It is more than probable that we are as yet only in the beginning of this wonderful development, and that the industrial chemistry of the future will yield a harvest even more magnificent than it has done in the past. Much that has been sown has not yet reached maturity, and new seed is constantly being entrusted to the fertile soil. The investigation of the natural resources of foreign countries has shown that the conditions of industrial chemical work are by no means everywhere the same as in the civilised countries of Europe, and that in some cases they are more favourable. The liquid and gaseous fuels of the United States and of Russia are ample proof of this assertion. Great continents overflowing with wealth are yet awaiting their

development ; all that we know of them is that they harbour treasures of enormous magnitude, and that these treasures can only be raised by methods different from those which we have adopted for developing the resources of Europe. Yet the technical chemistry of Europe will for ever be the starting-point for the development of the technical chemistry of the world.

With this bright prospect before us it is only natural that we should be very anxious about the proper education to be given to those who are destined to develop and enjoy what to us is but a brilliant vision. Hence the great importance that has of late been attached to all discussions on the proper teaching of applied chemistry. If, in such discussion, the question has now and then been considered from a national point of view, the natural conditions of the country in question had to be taken into account. On the occasion of this International Congress, however, the noble struggle between peacefully competing countries can be of but secondary importance compared to the question equally important to all civilised countries, how we are to prepare our sons for their future work, how we are to protect them from the errors into which we have occasionally fallen ourselves, notwithstanding our success.

From the foregoing sketch of the prospects of industrial chemistry, it is apparent that no definite view can be formed of the exact shape which the chemical industry of the future will take. Even in its original home, in Central Europe, the chemical industry of to-day is totally different from what it might have been expected to become by the most experienced technologist fifteen or twenty years ago. The great secret of the success of applied chemistry lies in its versatility, which enables it to adopt ever new and varying means for a useful purpose. On the other hand this very versatility prevents us from forming a definite idea of the exact nature of the road which will lead us to success.

The natural consequence of this uncertainty is the conclusion that our most important task in the education of young industrial chemists is to make them men of many resources. A special training, which may be useful enough in less changeable branches of manufacture, is little short of disastrous in all branches of chemical industry.

There is no objection to a special education, say, for engineers. For, no matter how brilliant the success of the newly-invented machines of the future may prove to be, the methods of working the parts of which they will be composed will remain essentially the

same, and will only undergo modifications making them more effective and generally applicable. The methods again of estimating and calculating such machines will for ever be based on general considerations of mathematics. If a young man has thoroughly mastered both the theory and the rational construction of a steam-engine, he will not find great difficulty in the construction of a motor for compressed air.

The same conditions do not obtain for chemical manufacture. In our sphere it is not the methods of execution which undergo changes so much as the principles on which the manufacture is based. The consequence is that a young man specially trained for some branch of chemical industry would find his knowledge of but little use a few years after leaving the school in which he received his training. In order to remain efficient in his work he would have to acquire knowledge which has been considered unnecessary by his teachers, and in so doing he would have to undergo the weary task of becoming a self-made man.

This difference of industrial mechanical and chemical work is greater than perhaps it may seem at first. It is more of a qualitative than of a quantitative nature. The mechanical arts, dealing with the physical properties of matter, are comparatively simple in their theoretical foundations, but of almost unlimited variety in their practical resources. Applied chemistry, on the contrary, is comparatively simple in its practical aspect, but extremely varied and complicated from a theoretical point of view. From this it results that the only possible way to success in applied chemistry is the acquisition of sound theoretical knowledge. It is a complete scientific education, which we must give to our young chemists in order to enable them to be successful in their industrial career.

Chemistry as a science is an organic whole, and its parts are inseparable. It is therefore a great mistake to think that the theoretical education of a young chemist may be limited to that part of chemistry which forms the basis of some given industry. Even the distinction, so often made, between inorganic and organic chemistry, cannot be upheld if we examine the subject logically and carefully. Organic chemistry is but the chemistry of carbon compounds, and there is no reason whatever for excluding one element from the theoretical education of a young chemist. The theoretical foundations of the chemistry of to-day are in a

great measure derived from research in the domain of organic chemistry, and the information of a chemist who would strictly limit himself to inorganic chemistry would for ever remain incomplete and undigested.

No matter, therefore, what the ultimate destination of a chemist may be, his education should be strictly scientific and theoretical, and it should embrace general, inorganic and organic chemistry, without any preference for any or either of these separate subjects, but with constant reference to their various applications.

The success of the German chemical industry, so much commented upon of late, is in a great measure due to the fact that the men who founded it were the pupils of chemists, like Liebig, Wöhler, Hofman, and others, who knew no higher ambition than the thoroughly universal and scientific instruction of those who had the privilege of working in their laboratories.

From the foregoing remarks it will be evident that I am no adherent of special technical education in applied chemistry, if by that term we imple a one-sided preparation of young men for a single branch of chemical industry, no matter what that branch may be. Dyeing, calico-printing, and paper-making are perhaps the only chemical industries which may rightly claim the necessity of some special instruction in the methods of their manipulation. But there is no reason why this instruction, which is comparatively simple, should of necessity be separated from the theoretical training of a chemist. Of course the great centres of these industries will always demand and have their special schools for the education of young chemists for their factories. But if these schools are to be really useful, if they intend to produce men who shall be the originators of progress in their manufacturing districts, they will have to make provisions for as complete and efficient an instruction in theoretical chemistry as may be obtained anywhere in a university.

If thus pure chemical science is to be the foundation-stone of all chemical instruction, it becomes necessary to say a few words about the proper way of teaching chemistry as a science. Here I must say, that I do not agree with the method adopted now-a-days in many schools that I am acquainted with. There is a great tendency to accentuate the hypothetical chapters of the science at the expense of its practical and experimental side.

As is natural, a science of so progressive a

character as chemistry cannot do without a good deal of hypothetical speculation. The theory of aromatic compounds, the considerations on the valency of the elements, the periodic law, even the atomistic theory itself are all nothing but hypotheses, though indispensable for the proper understanding of chemical reactions. So great has been their influence on the progress and development of chemistry, that slowly and gradually many chemists have got into the habit of considering them as the real essence and element of chemistry, whereas in reality they are nothing more nor less than general expressions of countless experimental observations. They are the great landmarks in that wonderful system which alone enables us to grasp and oversee the vast domain of chemical transformation. But they assume the nature of mere philosophical tricks, if we try to consider them apart from chemical facts in an abstract manner. That is what many chemists are now in a danger of doing.

Almost all our chemical text-books begin with the explanation of this hypothetical part of our science, and many lecturers do the same, whereas the proper way would be to make the beginner acquainted with facts and to derive from them the laws which govern them. The consequences of such a mistake are almost ineradicable. The young chemist, once accustomed to consider theory as independent of its experimental origin, does not see the necessity of connecting it with his experimental work in the laboratory. The consequence is, that the majority of the young chemists of the day, instead of being imbued with one living science, are possessed of two things, both of doubtful value: theoretical knowledge, acquired by memory and soon forgotten in practical life, and practical rule of thumb, incapable of helping them in serious research.

Yet the highest object of all chemical instruction is to show the way to chemical research. No matter what the ultimate career of the young chemist may be, whether he devote his energy to pure or to applied science, patient research will always be his only way to success. Whether his object be to create a new industry, starting from a new raw material, or whether his task be to improve old processes or to find the causes of troublesome difficulties—the way to success in all these different tasks is always the same, it consists in a logical application of the old, well-known and time-honoured methods

of experimental research, either analytical or synthetical.

Our young chemists of the day are not sufficiently indoctrinated with the view of an experiment, as a question addressed to Nature. Being accustomed to consider theories independently of facts, and facts independently of theories, they are incapable of drawing conclusions from one experiment, and making them the basis of the next following one. Consequently they are incapable of research, for research is nothing else than a succession of experiments, each forming the direct consequence of the preceding one.

It will no doubt be considered remarkable, that I, a teacher of chemistry in Germany, the home of research laboratories, complain of an insufficient capacity for research in the majority of our young chemists. Yet that complaint is by no means unjust, and the cause of the difficulty complained of is perhaps still more remarkable than the necessity for the complaint. This cause is nothing more or less than the fact, that most young chemists devote themselves to research at too early a period of their studies.

To be successful in original research a chemist should be fully conversant with all the difficulties of chemical manipulation. This is but rarely the case with the young chemists of the present day. Their manipulative skill is quite undeveloped. They are sadly inexperienced in the art of building up an apparatus for a complicated chemical experiment, they have an unjustified dread of somewhat complex analysis, they are totally innocent of the indispensable auxiliary arts of glass-blowing, grinding, filing, &c., and, what is worst of all, they are insufficiently acquainted with the use of that instrument—which has created modern chemistry—the balance.

How are we to change all this? By a proper reorganisation of the early stages of chemical instruction.

I have already indicated that lectures on chemistry should not begin with the explanation of chemical theories, but with the demonstration of facts, which should be chosen in such a manner, that the theoretical conclusions may be deduced from them. In the same way instruction in the laboratory should begin with the observation of reactions, chosen in such a manner, that by degrees some of the simpler methods of manipulation are acquired by the pupil. As soon as he is acquainted with these he may begin to make preparations, starting with products of a simple composition, and

transforming them into others by processes, the nature of which he is able to understand; but as soon as he begins this work he should also begin to use the balance. In every experiment he should use weighed quantities of raw material, and he should ascertain the weight of the intermediate, final and by-products. The experiments should be chosen in such a manner, that more and more complicated apparatus is required for them, and great care should be taken in insisting that every experimental plant constructed should be faultless in all its details.

Only after having acquired considerable skill in chemical manipulation should the student begin to do analytical work. After a short practice in qualitative analysis he should begin with quantitative work. Being acquainted with the necessity of ascertaining the weight of all matter taken into work, he would now easily become familiar with the use of the analytical balance, which would not remain (as it unfortunately does very often at present) an object of fearful veneration, but become an indispensable and well understood tool. This quantitative analytical work should be supplemented by a number of thermo-chemical and physico-chemical experiments.

Whilst this experimental work is carried on, the student has become acquainted in his lectures with the subject of organic chemistry. Organic analysis may now be taken up in the laboratory. As soon as the young chemist shows some efficiency as an analyst of organic substances it is time to begin with organic preparations; but here again an exact record should be kept of the quantitative conditions of every experiment. The use of weights and measures should become second nature to every chemist, and nothing is more important in the practical instruction of a chemical beginner than to imbue him with the conviction, that merely qualitative work is imperfect by nature and only admissible as a preliminary preparation to the quantitative experiment, which, if properly carried out, is perfect and necessary as a supplement of the qualitative observation.

Another important point in chemical instruction is the constant reference to the practical applications of facts and theories. If the teacher would take constant care to explain what are the conditions of an experiment, what alterations in the plant are necessary for its execution on a manufacturing scale, and why such alterations are necessary, then he would contribute more towards the formation and growth of

industrial comprehension in his pupils, than can be done by any special technical instruction.

I have no hesitation in saying, that a young chemist, who has followed with all necessary industry and intelligence, a course of instruction such as I have sketched it, will be properly prepared for original research. This is equivalent to saying that he will be equally prepared to fill with advantage a position in a chemical factory in any branch whatever. His education will be complete and what he still lacks will be the experience and the rapidity of practical work, which can only be acquired by continued practice.

A few words remain to be said about the other subjects which, besides chemistry, should be taught to every young chemist. Of course, he should receive a proper instruction in physics, the elements of mechanical engineering, technical drawing, mineralogy, botany, &c. A certain knowledge of all the exact sciences is indispensable to every chemist, whether he intends to devote his work to industrial or to purely scientific research.

The essence of my investigation is, that I cannot admit any fundamental difference in the methods of research of pure and applied chemistry. Consequently I cannot admit the necessity of a difference of instruction for the two. A well organised instruction in pure chemical science would, in my opinion, be the best preparation for any young chemist for his future career. The method in use at present seems to be capable of improvement. Though much of what I have brought forward would not seem new to many of my colleagues, yet it cannot be said to be generally admitted, and it is certainly worthy of the most serious consideration.

We want no schools for producing specialists. Specialism comes as a matter of course in later life. But no matter how deep any chemist may involve himself in the intricacies of any given subject, he can still gather useful information for his own work from the contemplation of work accomplished in other branches of his science. If we want our schools to produce men fit to reap the great harvest before us, then let them produce chemists who enthusiastically embrace their science as a whole, and who are incapable both of separating practice from theory, and theory from practice.

At the conclusion of the reading of the paper, Sir JOHN DONNELLY, K.C.B., said that it was at his

special instigation that Professor Witt prepared his paper, that he (Sir John) had no knowledge of what his views might be, but he did know that from his position and previous experience no one was better qualified than Dr. Witt to give a valuable opinion. It was, therefore, with great satisfaction that he had read his paper, as it so thoroughly endorsed the views which the Science and Art Department had endeavoured to inculcate, so far as it could, in the classes connected with it, that the only true foundation for technical education was a thorough instruction in general science, and also in its endeavours to impress upon schools the vast importance of practical work in any scientific education.

### HEURISTIC INSTRUCTION IN PHYSICAL SCIENCE.

BY H. E. ARMSTRONG, Ph.D., LL.D., F.R.S.

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However diverse, or even incompatible, may be the meanings which are read into the expression "Technical Education" by the various persons who nowadays constantly refer to it, the movement in this country is undoubtedly the outcome of fairly universal recognition of the fact that modern requirements are not met by the provisions made in our schools, colleges and universities.

Of late years, we have learnt much from the various attempts that have been made to improve the teaching, and the experience gained will be of the greatest value in enabling us to shape our future course. Yet it is clear that in introducing new subjects of instruction, and in seeking to establish a new tone of thought, we have rarely been sufficiently mindful of the principles underlying all true teaching; and much remains to be done if we are to develop a consistent and complete doctrine of education. The efforts made have too often been but sporadic and uncoordinated. Under the English system especially, education is far too much an affair of buildings: method and teachers, the primary factors in the problem, play as yet an altogether subordinate part. And it cannot well be otherwise, as it is very largely a case of the blind leading the halt, for we have yet to discover new and more suitable methods, and of necessity there are few who have the ability and experience requisite for successful work in such a field. But as those who control affairs are for the most part entirely without technical experience in education, it is all important to lay down for their guidance the principles on which success

must depend: meetings like the present Conference offer an invaluable opportunity, and I therefore crave leave to briefly recite the history of a movement with which I have long been intimately connected, and which I venture to think is likely to contribute in no slight degree to our public welfare, by developing exactly the spirit that it is so necessary to create if we are to work with advantage under modern conditions.

On the occasion of the important International Conference on Technical Education held in London in 1884, in connection with the Health Exhibition, it was my privilege to read a paper on the teaching of natural science as a part of an ordinary school course, in which the method of teaching chemistry in science classes, schools and colleges was discussed.

Fortunately, I have since had the opportunity of gaining much further experience, and have been able, in consequence, to very greatly improve and develop the scheme of instruction I recommended. Meanwhile, I have had the very deep satisfaction of seeing the ideas advocated in 1884 put into practice by others and favourably reported on. In fact, the principles of the party I represent are gradually becoming fashionable—even the compliment is being paid us of “stealing our thunder,” and books are being written to display what some are pleased to term the *new method*: but these are chiefly interesting at present as showing how difficult it is, even for those who would rate themselves our disciples, to fully grasp our meaning, and to divest themselves of the prejudices acquired in working under conventional conditions.

It is satisfactory, however, that not only have our pleadings influenced Government Departments, but it is even rumoured that so ultra-conservative a body as the University of London may, at no distant date, also to some extent adopt our principles and introduce changes which might, with the greatest benefit, have been made at any time during the past dozen years—changes which certainly would have been made years ago if it had been incumbent on an University in this great metropolis to seriously engage in the work of education, and to consider methods of teaching instead of paying exclusive attention to the soporific but lucrative business of examining.

To continue my historical account: in 1887, a highly representative committee was appointed by the British Association to inquire into and report upon the present methods of teaching chemistry. A preliminary report was presented by the committee in 1888, and in

the two following years further reports were made which had the inestimable advantage of being constructive. The attitude adopted by this committee is expressed in the following quotations from their report presented in 1889:—

“The committee are convinced that the high educational value of instruction in physical science has never been exhibited to its full advantage in most of our educational institutions. Nevertheless there exists already a considerably body of experience which proves that there is no more effective and attractive method of training the logical faculties than that which is afforded by a properly arranged course of instruction in physical science; by no other means are the powers of accurately ascertaining facts, and of drawing correct inferences from them, so surely developed as they are by the study of this subject.

“It cannot be too strongly insisted that elementary physical science should be taught from the first as a branch of mental education, and not mainly as useful knowledge. It is a subject which, when taught with this object in view, is capable of developing mental qualities that are not aroused, and indeed are frequently deadened, by the exclusive study of languages, history, and mathematics. In order that the study of physical science may effect this mental education, it is necessary that it should be employed to illustrate the scientific method in investigating nature, by means of observation, experimenting, and measuring with the aid of hypothesis; the learners should be put in the attitude of discoverers, and should themselves be made to perform many of the experiments. The lessons ought to have reference to subjects which can be readily understood by children, and illustrations should be selected from objects and operations that are familiar to them in every-day life. Chemistry is particularly well-adapted for affording this kind of instruction, and the committee are of opinion that a course which is mainly chemical will be most useful in developing logical habits of thought.

“Chemical inquiry involves, however, the use of various physical processes, and these are themselves of great value from the point of view from which the instruction is being given. It is also of great importance that the learners should become acquainted with the characteristic instrument of physical science, viz., measurement, and therefore quantitative processes should be largely made use of.

“They do not desire to bring forward physical science as a substitute for any of the subjects of study, but they ask that like these subjects it should be looked upon everywhere as a necessary part of education, and that it should receive a due share of the time devoted to school work.”

A series of suggestions for a course of elementary instruction in physical science, drawn up by me, were embodied in the Report issued by the British Association Committee in 1889, and further suggestions of mine were printed

in the Report issued in the following year. These British Association Reports have, in consequence, I believe, served as text-books for several years past, and have thus been of considerable service to teachers.

In my paper read at the Health Exhibition in 1884, when drawing attention to the imperfections in our methods of teaching as the chief explanation of the backward position of science, I pointed out that the earnest cooperation of a number of specialists was needed in order to develop a rational system of instruction suitable for schools. Nothing is more striking than the apathy of teachers in these matters, and their slowness to avail themselves of the infinite opportunities at hand to engage in *educational research*. The point is worth making, as this apathy probably arises from the fact that teachers generally are themselves without training in the methods of research—indeed, in common with the general public, have far too often no clear conception of the meaning of the word. Consequently, if we are to improve the race of teachers, one of the first things to be done—whatever may be the subject to which they are to devote themselves—is to so train them that they may be in a position to develop satisfactory methods of teaching. It stands to reason that we neither are attained, nor ever can attain, to finality in such matters, and that as we cannot yet properly teach those who would be teachers how to teach—for we do not yet know ourselves—we must fit them to be always learners themselves. A purely didactic system, such as we now follow, which gives us no such help, stands self-condemned.

The keynote of the recommendations of the British Association Committee is in the sentence—"The learners should be put in the attitude of discoverers." The method we advocate is well termed the "Heuristic" method (*εὕρισκω*, to find out); it is the absolute antithesis of the didactic method.

Although the British Association Committee's report contained suggestions for a course of elementary instruction in physical science, no actual syllabus of a course was in the hands of the public until a couple of years ago, when a committee of the Incorporated Association of Head Masters took the matter in hand and issued a syllabus together with brief instructions as to the character of work to be done by students; this was practically a reproduction of the British Association Committee's scheme. The Incorporated Association of Head Masters not only adopted the syllabus drawn up by their committee, but took the

further important step of memorialising both the Cambridge and Oxford Local Examinations Syndicates, requesting them to introduce the course into their scheme of examinations. Their recommendation was in due course adopted.

But even at an earlier period, now more than five years ago, heuristic instruction on the lines recommended by the British Association Committee was introduced into one of the four districts into which the London School Board is divided, viz., into the East London and Tower Hamlets division, by Mr. Hugh Gordon, M.A., to whose energy, tact and skill we are indebted for the proof that work such as the British Association Committee contemplated can be carried out with the greatest readiness even in public elementary schools, and with the most favourable results. Since Mr. Gordon's appointment as an inspector under the Science and Art Department, the work has been continued by Mr. W. M. Heller, who has been equally successful. Both Mr. Gordon and Mr. Heller have done the greatest service by gradually training the existing staff of teachers in their district to carry out the work—in fact, they have experimentally ascertained and demonstrated how heuristic training in physical science can be actually carried out in schools: a particularly important achievement in view of the character of the material they had to deal with.\* The syllabus under which they have worked was introduced first into the evening schools' continuation code, and subsequently into the day schools' code for boys; only this year a similar scheme appears in the code for girls. Unfortunately the code still permits the teaching of so-called specific subjects—such as agriculture, electricity, magnetism—and in a manner, moreover, which deprives the teaching of all educational value. A memorial was addressed to the Vice-President of the Committee of Council on Education early in the year by the Joint Scholarships' Board—a highly representative body that is probably destined to play an important part in the future organisation of our educational forces—but it is almost needless to say that the recommendation was passed over which this Board made that direct encouragement should be given to a course which practice proves to be rational, successful and scientific, rather than to the purely

\* Most important testimony to the value of their work is given in the letter at the end of this paper, which I am permitted to quote, from the distinguished physicist, Professor Fitzgerald, F.R.S.



didactic teaching from which it is impossible to escape when specific subjects are taken. The day is probably far distant when educational questions of moment will be dealt with officially on their merits in this country—private effort and the pressure of public opinion at meetings like this can alone be relied on to effect the necessary changes.

I have dwelt on the history of the attempt to introduce the heuristic method into schools because I am firmly convinced that there is no more important subject for consideration on an occasion like the present. It should need no argument to prove that it is necessary to train boys and girls to use their wits and help themselves, but it is surprising how very few are prepared to admit that any departure from established methods, such as we advocate, should be made. The fact is—and it is important to state it in all its nakedness and with emphasis—we are using language which is strange even to nearly all who are directly engaged in the work of education. Our position, therefore, is a difficult one, and we can but ask that we be given proper opportunity of proving in practice that our method is sound and when properly applied gives results far superior to any attained under existing conditions. It has the advantage of being a method which is applicable to all subjects, and we contend that it should be applied to all subjects. It is only because chemistry offers opportunities which probably no other science offers to the same extent, that it is advocated that this subject be largely made use of in schools: but the chemistry we desire to have taught is neither the chemistry of the text-books nor that of the technical chemist; and it does not merely involve making a few gases, &c., and indulgence in a certain amount of elementary test-tubing. What we aim at is the reintroduction of the style of work practised by men such as Black, Scheele and Lavoisier. When thus carried out, chemical education cannot be otherwise than a most efficient preparation, especially for those who desire to follow an industrial career.

All who are engaged in the work of technical education proper are agreed that at present it is almost impossible to obtain satisfactory results owing to the fact that the students have not been properly prepared at school. If we can but succeed in disciplining the minds of students while at school, they will then be able to devote themselves to technical studies with far greater advantage than has heretofore been the case.

But there are many directions in which changes must be made. A fundamental fallacy of modern education, and probably of technical education especially, arises from the desire to cover too wide a field. The inspectors are hampering the development of heuristic teaching even at the present time by complaining that progress is far too slow in the direction of acquiring knowledge of facts: they will not sufficiently recognise that habits are of primary importance. The execrable system of examinations we have allowed to grow up has engendered an altogether false conception of what a child is and can do and should do: we are fast coming to regard the pupil as a kind of animated set of pigeon holes, into which every sort of fact can be crammed and taken out again when required; experience shows, however, that the child behaves much as the pigeon holes would, taking in and giving out information more or less readily, but without digesting it—without ever learning to properly apply it.

Each year the demands made upon the student increase with the growth of knowledge. The period of study is all but entirely absorbed in acquiring knowledge of what others have done, together with a certain amount of mechanical dexterity. But worst of all, an entirely false mental attitude is engendered by the ever present fear that the examiner will ruthlessly demand a balance of accounts.

It is very strange that we should be engaged in depriving our educational system of almost every element of elasticity by instituting a modern inquisition outwardly less cruel than that by which our forefathers were at one time oppressed, but probably far more insidiously fatal and widespread in its effects; and strangest of all that we should allow such an inquisition to become established in private hands, and free from State control, as a highly lucrative business.

As it is necessary to state in advance what will be the requirements of the examiner, examinations cannot fail to be behind the times; but their worst effect is the tendency they have to stereotype teaching, and especially to lead the student to pay attention only to those matters which will meet with official recognition. It is in this respect that the Germans are so vastly ahead of us in their universities; they alone put proper faith in their teachers, and success has entirely justified their action.

It is true that in not a few cases at present, those who are examining are among the most

competent teachers, and that the examinations serve the useful purpose of guiding teachers who are incapable of devising rational and satisfactory courses of instruction. But this is only a temporary condition of affairs, and it behoves us to see that in creating a system useful under present conditions we do not seriously prejudice our chances in the future when more healthy conditions come to prevail.

Steps should certainly be taken to stamp out the disease of certificate hunting and prize taking which is gradually spreading over all classes—a higher moral purpose should dominate both teachers and students. In London especially is this necessary. Nothing is more surprising—and nothing more clearly illustrates how little originality is embarked in our educational enterprises—than the fact that the various London Polytechnics, each one of which should be a centre of independent and uncontrolled effort, are very largely engaged in teaching for the Science and Art Department Examinations. Such examinations, no doubt, have in their day served a useful purpose, but for the most part they have long since ceased to be otherwise than a hindrance to educational progress—a fact which is gradually but all too slowly being recognised, and which it is sought to remedy by the appointment of inspectors in place of examiners. But the greatest care will have to be taken in making this new departure, for unless the inspectors have been heuristically trained, they may become even a more serious danger than the examiners, as it will be more difficult to criticise their actions. Some machinery must be organised whereby those in whom the control of education is vested are perpetually brought into contact with those who are engaged in the work of education, and especially with those who are actively engaged in improving the methods of teaching, *i.e.*, in educational research.

It is the entire absence from our English system of any regulated and complete course of training as the necessary preparation for industrial and tutorial occupations that has given such fictitious value to certificates, and therefore to examinations. Let us hope that the time is not far distant when evidence of training—and before all things, of heuristic training—will be regarded as of chiefest value.

But whatever be done, it is surely desirable that we should be scientific in evolving a programme for the future; that we should consider the nature of the problem in hand, and

while making the fullest use of accumulated experiences should free ourselves, as far as possible, from the influence of tradition. Our present system, be it remembered, has been gradually evolved to satisfy conditions altogether different from these under which we now work, and it stands to reason that we should be prepared to dispense even with much that has proved to be of value in the past.

We cannot go wrong, if we set to work from the proper point of view. A vast change has taken place within recent years owing to the introduction of practical studies—in fact, quite a revolution has been effected in this direction. But there is undoubtedly a tendency for such work to be done in too mechanical a style. If we can but graft upon the modern tendency to be practical a proper utilisation of heuristic methods, we cannot fail to succeed in training up a race of competent workers of all grades.

“Trinity College, Dublin,

“6th May, 1897-

“DEAR MR. HELLER,

“I have had a good opportunity of comparing the methods of science instruction in several different places in England during my recent visit to England in connection with the ‘Commission on Manual and Practical Instruction in Primary Schools in Ireland.’ I took a very keen interest in what I saw, and especially in your work in London. I have been most favourably impressed with the methods you are employing, and from what I saw of its work in the schools am convinced that it is working out in practice what it is designed to do, and is capable of being introduced into any school by intelligent and well-trained teachers.

“Your methods are intelligible methods, and can consequently be made the basis of an intelligible system, which can control all the methods of the teacher, and give him an intelligible clue for developing the methods, to suit the varying circumstances of his school and locality. In that respect it seems to me to have an overwhelming advantage over what I may describe as, the hand-to-mouth methods of others.

“With the deliberate end in view of teaching children by a connected system of simply-graduated experiments to learn how to read nature, make her answer their questions, and thus provide themselves with the means of learning her laws, and how to control her for their advantage, you have a fundamental principle of true scientific education that puts the child in possession of the means of further advance, and is quite as essential to its well-being in life as to give it the ability to read.

“Most other methods of scientific education are analogous to the aboriginal methods of literary education by teaching children to learn Homer by heart.. So far it was of use, but when literature grew it was.

much more important to teach a child to read than to teach it almost anything by heart. Similarly, the really important thing in scientific education is to give a child the ability to read nature and to understand her. The time has gone by for learning off all that is known about her.

"The methods of experimental enquiry are themselves so very different from those of literary enquiry that they must be specially taught, and the methods of teaching them differ in so many important respects from the methods of teaching things that can be read about, that it is essential that the teachers of the methods of experimental enquiry (a much better general term than Physics, Chemistry, &c.) should have a special training.

"This is all the more necessary at present when we are trying to change the system of scientific instruction from that into instruction in the methods of experimental enquiry, because so many of the teachers and of would-be teachers have already had wrong ideas implanted in them by being brought up in a very imperfect system.

"At the same time that a practical training of teachers to these good ideas is so essential, the fact that an intelligible system and an intelligible end underlies your methods should ensure that your system and ideals could be grasped and worked out by any properly trained teacher.

"I have been so fully impressed with the advantages and workability of your system that I shall use my endeavours to have this rational system introduced wherever practicable in our Irish schools, and feel no doubt that wherever any science education is practicable, your system, modified as to its details to suit localities, &c., but unmodified as to its ideals and essential methods, will be found by far the most practicable of any, and by far the most valuable as regards its results.

"Yours very sincerely,

"GEO. FRAS. FITZGERALD."

#### THE TEACHING OF CHEMISTRY IN EVENING CONTINUATION SCHOOLS.

By J. H. GLADSTONE, Ph.D., D.Sc., F.R.S.

The teaching of chemistry is provided for in several ways by the Government Code for Evening Continuation Schools. It is encouraged by grants, and leads up naturally to the more definite technical instruction which is given in colleges and polytechnics, and under the auspices of County Councils.

Chemistry appears in the Code as one of the science subjects of the Schedule. It may be taught as a continuation of lessons given in the elementary schools under the same name, and it may be a preparation for classes under the Science and Art Department. It also appears under the heading of "Elementary

Physics and Chemistry," which is defined as "a systematic course of practical instruction for the scholars themselves. The complete set of experiments should be carried out by the class (*i.e.* the scholars) as a whole." This includes measurement in all its branches, with air, water, and chalk very fully investigated. It does not lead so directly to the Science and Art Department's examination, but it would be a natural sequence to the instruction given with much success in many of the London Board Schools, and it is of special educational value. Chemistry occurs also under the heading of "The Science of Common Things," which is defined as "a brief survey of physical properties of bodies serving to determine their uses and relative value," and includes "the most essential facts and principles of inorganic and organic chemistry." The same science again forms part of the subject "Domestic Science," which appears in the Code this year for the first time. The intention is "that the instruction in this subject should be based on experiments performed as far as possible by the children themselves. The applications to the home should be the results of the discoveries made in the course of the experiments, which should be undertaken in a spirit of inquiry or research." Thus, in the extended syllabus, each point is illustrated and enforced by some practical work, and it may be looked upon as the chemistry of the home.

These subjects have not been much taken up in the evening continuation schools of the metropolis. In the report of the London School Board for 1895-96, it appears that out of the great aggregate of 69,900 completed twelve hours attendances on which the Education Department have paid grants, "Chemistry" accounts for only 404, "Physics and Chemistry" for 152, and "The Science of Common Things" for 468. The total of these three being 1,024, only one-sixty-eighth part of the whole. In the classes under the Science and Art Department it appears that, out of 4,376 scholars, only 255 took chemistry, one-seventeenth of the whole.

In Manchester, on the other hand, documents furnished me by Mr. C. H. Wyatt, Clerk to the School Board, show that they have a very elaborate system of Evening Continuation Schools, with 12,451 scholars, in which elementary science is one of the subjects taught. These, together with the Higher Grade Day Schools, with 6,619 scholars, lead up to six Science and Art Evening Schools in which chemistry, both inorganic and organic, is taught by means of lectures illustrated and explained

by experiments and specimens. Laboratories for practical chemistry have been fitted up at each of these schools, with one exception. These six contain at present 2,738 students. The Evening Continuation Schools also lead up to the Evening Institute for Women and Girls, with 970 students, in which there seems to be a good deal of applied chemistry in the form of cookery, hygiene, &c.; and to the Commercial Evening Schools, with 4,261 students, in which elementary science may be continued. The system is rendered complete by the Central Science and Art Evening School, which practically teaches the whole of the subjects comprehended in the directory of the Science and Art Department. The control of this school has lately been handed over to the Technical Instruction Committee of the City Council.

Very important is the method of teaching science in these evening classes. It is possible to give instruction in chemistry merely by means of books or oral lessons; this would make it a mere unintelligent exercise of the memory, and would waste the scholar's time. Chemical and physical science is often taught by means of demonstrations, the teacher showing pictures or specimens of the subjects mentioned, or performing experiments before the class with good apparatus and proper explanations. This is good, for it gives a certain amount of information and arouses curiosity. But there is another method which appears to me far better: that of the student himself handling the objects and making the experiments under the supervision and direction of the teacher, and making notes of what he has done or seen. This method will lead to few results that can be tested by an ordinary examination; but it will train the student's power of observation, educate his senses, give him facility in arriving at accurate knowledge, and form in him habits of mind which will be invaluable to him in his future career. The lessons should be simple, for an untutored mind will generally be very slow in grasping ideas; the objects presented should be few in number, and well chosen; and the experiments should be made as far as possible by means of things with which he is familiar. Thus the phenomena of solution can be better shown by using sugar or salt, than any of the strange things in a druggist's shop. Novel or complicated apparatus is to be avoided, as it puzzles the brain of the beginner, and draws off the attention from the facts that are to be studied; besides which it costs money. The greatest discoverers in chemistry, such as

Cavendish and Dalton, usually worked with the simplest of tools and apparatus. The Royal Institution possesses a collection of corks, bits of sealing wax, twisted wires, and such common things, with which Faraday investigated the secrets of nature. Galileo, watching the swing of the lamp hanging from the roof of the Cathedral at Pisa, measured the period by counting the beats of his own pulse, and in this way he made the great discovery of the isochronism of the pendulum. The pupil should be directed to observe carefully which is much more easy when the objects are handled and the experiments are made by himself, and the practice of making written notes will greatly quicken his perception. Accuracy of weighing and measurement should be required, as far as the means of observation will admit, yet he should not be allowed to suppose that absolute accuracy is obtainable, even when he is using elaborate apparatus, but rather should be led to form an estimate of the probable limit of error in his work. Whether the young student has an intelligent appreciation of what has taken place in his experiment will be discovered probably by the way in which he describes it; and if the teacher finds that it is erroneous, he will suggest such a modification of the experiment as will lead the learner to perceive for himself the inadequacy of his former idea, and to substitute some more correct description or explanation.

Though the first and main object of the teaching of chemistry should be an educational one, there is no reason why practical applications should be ignored. They will generally give additional interest to an experiment, and will serve to fix it on the memory. There is, moreover, a double advantage if the scientific lessons of the school can be put into practice in the workshop, the home, the kitchen, and the laundry.

Of course, many of the boys and girls in these evening classes will be engaged in future life in industrial pursuits where the knowledge of chemistry will be of direct service. When the school is situated in the neighbourhood of factories, it would be allowable and even desirable that the illustrations should be chosen with some reference to the prevailing industry. The lessons of the Continuation School will then prepare the way for the technical classes properly so called. Yet in the midst of practical applications it should never be forgotten that the main purpose of the scientific training here described is to develop the perceptive and reasoning faculties, to increase the pupil's interest in nature, and so to fit him

better for whatever duties he may afterwards be called upon to fulfil.\*

The CHAIRMAN asked Sir Henry Roscoe to commence the discussion on the foregoing papers, as he could not be present at the afternoon meeting.

Sir HENRY ROSCOE, D.C.L., F.R.S., said it could not be otherwise than gratifying to an old chemist—for he might call himself one, having taught chemistry for thirty years—that the first business of that International Congress should concern itself with the teaching of chemistry. He thought it was rightly so, for it was a subject, amongst all others, which lent itself, as Professor Armstrong had so clearly shown, to the application of what they might call primary scientific education. Looking back over a considerable length of time, he thought that all those who could remember what the condition of science teaching in schools was twenty-five or thirty years ago, would acknowledge that the progress which had been made was really marvellous. Then, the practical teaching of chemistry, or of any other branch of science, was unknown in the schools, but now, wherever a school of any considerable magnitude existed, they would find a well-fitted chemical laboratory. Much, however, remained to be done, but he thought all interested in this new education—or this new development of education—would congratulate themselves on the papers which they had just heard read, because they had been prepared by men of ripe experience, who were anxious that the old system should give place to the new. Dr. Armstrong had put forward his views so clearly and so forcibly that he thought they would commend themselves generally to those interested in the subject. Dr. Gladstone had done so much for the encouragement of education, especially scientific education, in the London County Council, where he had served for so many years, and on the Committee of the British Association, that his remarks would be received with great consideration. It must be remembered that in putting forward these views, they were really breaking new ground, and, from what had been said, we might fairly conclude that the position which primary education, from the scientific point of view, was taking in England was of a most satisfactory character. What we in England suffered from—and it was well that it should be known—was that our manufacturers did not at present see as they ought to see, the importance of the highest scientific training as applied to their industries. The other day he visited a large colour works near Frankfort, where over a hundred scientific chemists, highly trained, having devoted years to the prosecution of original research, were employed for the purpose of obtaining new results. We had nothing like it in England.

\* For a fuller treatment of some of the above points, see the admirable Presidential Address by Professor James Stuart, M.P., to the Norwich Conference of the Teachers' Guild, "Journal of Education," May, 1897.

The salaries paid to them were high. One gentleman had a thousand a year—a man of great distinction—and he did work there for years without obtaining any result of commercial value to his employers. After a while, however, he made a discovery which not only repaid them ten times over, but placed them in possession of a new branch of manufacture. That showed what could be done by the application of science to industry, and we should lay to heart the lesson which it taught. If only our manufacturers would appreciate the value of such work, we could turn out scientific men as well as any other country in the world. The point he wished to emphasise was that the manufacturers of England had not yet attained to that appreciation of the value of science which those in Germany manifested, because they gave but slight encouragement to scientific research. At the same time, they must remember that England had been the home of very many of the great discoveries in industrial chemistry in the past, and that it would be so in the future, he, for his part, firmly believed.

#### TUESDAY AFTERNOON, 15TH JUNE.

Sir OWEN TUDOR BURNE, G.C.I.E., K.C.S.I., in the chair.

#### REMARKS ON THE TEACHING OF CHEMISTRY.

BY GEORGE LUNGE, PH.D.,

Professor of Technological Chemistry in the Federal Polytechnic School, Zürich; Past President of the German Society of Chemical Industry.

Having been asked by those in charge of the preparations for the International Congress on Technical Education, to be held in London during the month of June, to contribute a paper on the teaching of chemistry, I beg to make the following remarks on this subject.

I have on various occasions given utterance to my views on the most suitable course of education for technical chemists; also in an address delivered before the international congress of chemists, held in Chicago in 1893. There is all the less reason for repeating in detail what I formerly said on that subject, as I agree in the main with the numerous English chemists who have recently given to the public their ideas thereon. More particularly I agree with the views pronounced by Professor H. E. Armstrong in his pithy letters to *Nature*, written only a few months ago. In a few words: In order to raise English chemical industry to the foremost rank which is deputed to it at present in several important branches, it is necessary that the technical management of chemical factories should not be left in the

hands of "rule-of-thumb" men, but should be entrusted to real chemists. These men should have a much fuller education than the majority of chemists seem to obtain at present in Great Britain, which means that they must spend more time and money on their training than they generally do. Before entering on their proper professional study at college, they should receive a more suitable general education, in which the "classics" need not be entirely left out, but must take a secondary place in comparison with modern languages, mathematics, drawing, and the elements of science. At college the student should receive a thorough training in scientific chemistry, taking this in its widest meaning, not merely as a "testing" business. Next to this, but not to the same extent, he should be taught physics, mineralogy, technology, mechanics, and the elements of engineering. Everything else is more ornamental than useful; but I am the very last to say that the student should confine himself only to the latter.

Nobody in these times of ours is likely to turn out a first-class chemist, worthy of being later on put in charge of a large factory, who has not tried his hand in original research. This has been pointed out with such cogency and emphasis by many authoritative voices in England (in Germany it has long been held as an article of faith) that I may abstain from dilating on that topic.

There is not quite so much agreement on the point whether technical chemists should be taught at college technology and the elements of engineering. Most people would take this as a matter of course; but there are influential voices to the contrary. We meet with such in the Report on the Teaching of Chemistry, made to the Technical Education Board of the London County Council in November, 1896. One gentleman declares the teaching of technological chemistry of no value whatever for chemical industries or for the pupils. Another declares that, although he had no preliminary technical training, and had been through theoretical courses only, he found himself able to cope with anything that cropped up when he entered manufacturing practice. Both gentlemen are eminently practical men for whom I, like all the world, entertain the greatest respect, but in the present case I cannot follow them, and I believe that their experience is too one-sided. I, for my part, trust that I shall not be judged arrogant for assuming my natural capability to be up to the average, but my experience has been as follows.

Having gone through a complete course of scientific chemistry and allied subjects (I rejoice to have had Bunsen and Kirchhoff as teachers), and having afterwards entered upon a technical career, I did *not* find myself "able to cope with anything that cropped up in practice," but I had to spend immense trouble and time, and to pay serious "Lehrgeld" for acquiring those elements of mechanical and technological knowledge which students now obtain as a matter of course in a good technical college. And this experience of my own agrees with so much else which I have observed in later life that I feel bound to retain my view of this subject as before stated. Nor do I stand alone in that. Not to speak of the practice of all the continental Polytechnics, which, after all, have some results to point to, great efforts have recently been made to introduce those technological subjects even at the German Universities, as it is felt that in that respect they are suffering under a drawback in comparison with the Polytechnics. A very forcible speech was delivered on April 28th of this year, in the Prussian House of Commons, by Dr. Böttinger, the head of one of the largest chemical manufacturing works in the world, with a staff of more than a hundred chemists (the Farbenfabriken at Elberfeld). Dr. Böttinger strongly demanded the establishment of more professorships of technological chemistry, also at the old Universities, in order to maintain the prominent position of Germany in the chemical industry, and the Government made a very encouraging reply to this.

It is quite intelligible why some large chemical manufacturers do not care very much about a preliminary study of technological subjects on the part of their chemists. At their colossal works they need specialists for each branch, and they cannot do without a staff of fully trained engineers, so that their chemists are not called upon to do any but strictly chemical work. Some owners of works may not even like their chemists to get too much insight into the practical and mechanical part of the manufacturing operations, for reasons which need not be dwelt upon here. But that cannot be our standpoint, as teachers, nor, do I venture to say, is it in the interest of the nation as a whole that a trade should be monopolised in a few hands, as it is the object of "keeping everybody to his last." On the contrary, we aim at educating our pupils in such manner that they can turn their energies into practical channels at any opportunity which may offer itself; for this purpose they must be able to cope with

mechanical and technical problems at the outset, and they must be taught to *think technically*, not merely as test-tube men. Of this I may be allowed to give an illustration from a huge industry which is after all quite as much a branch of applied chemistry as, say, alkali making, viz., the manufacture of iron and steel. Does anybody maintain that the enormous strides made in this industry in our own generation would have been possible if the iron-masters and their assistants had been brought up on a diet of pure chemistry and physics, leaving all the practical part and the engineering to be either performed by non-chemical engineers, or picked up at hap-hazard later on by themselves, instead of their going through a thorough training in the technology of metallurgy at mining schools or the like? This *reductio ad absurdum* is perhaps not quite so apparent and absolute in other branches of the industries built upon a chemical basis, but in my humble opinion it applies there as well. I cannot consider it as an accidental coincidence that Germany, which had been one of the leaders in theoretical chemistry for a long time past, without developing a chemical industry commensurate with it, should have attained to such prominence in the same industry precisely in the period when the establishment of Technical High Schools had provided her with a number of chemists, trained in something else than pure science. It is really unnecessary for me to point out that such a training in *pure science*, and that of a most thorough kind, is the indispensable forerunner of the teaching of practical subjects, but, although speaking *pro domo*, I cannot help saying that *technological chemistry* has also amply proved its right of existence, and its great importance for the progress of chemical industry.

I have hitherto had only those in mind who aspire to filling the higher positions in chemical works, and ultimately hope to become themselves managers or owners of factories. Of course, only a few can ever reach that goal, and the great majority must content themselves with obtaining intermediate positions, but if they have honestly worked during their college time, they may trust not to be left always in the condition of "testing-slaves," but to be promoted to manage some part or other of the real manufacture. According to the way they perform that work, they will have a chance of getting on higher and higher. Such promotion is, on the Continent, now confined to trained chemists, and I believe it is also more common than formerly in England to make

chemists managers of chemical works. So long as this is not a recognised principle, it is in vain to hope for retaining a foremost rank in chemical industry. It is another question whether it is necessary or useful for that purpose, as is sometimes claimed, that the foremen, or even the common workmen, should possess a certain knowledge of chemistry and technology, such as may be imparted at Board schools or at night classes for adults. I am afraid that such knowledge is quite useless to ordinary workmen, who have simply to do as they are told, and who may do more harm than good by trying to apply a superficial idea of the nature of the operations which they have to perform, without possibly having a real insight into them. I do not even think that, apart from isolated exceptions, such knowledge is of much good to the foremen, whose duty it is to carry out instructions and to see that the men do their work as prescribed by the staff, but who are not to meddle with the chemical process itself. Both classes of men may have valuable suggestions to make concerning apparatus and other outwardly visible points, but even if they have learned as much chemistry as they have had a chance to do in the ordinary way, it is most unlikely that they will be able to find out any improvements in the *chemistry* of the process. At all events, in Germany, even in those factories where the work is carried on with the greatest chemical refinement, the foremen and ordinary workmen are neither required nor even desired to know anything of chemistry. Formerly, it happened sometimes that one of the men, after getting such a smattering of chemistry as he was able to obtain by evening schools and the like, was driven on by an irresistible impulse to rise from the ranks, to supplement his deficiencies by hard work, and to become a successful chemical inventor. But such a contingency has become more and more scarce with the widening of the area of science and the increasing difficulty of mastering it, and it really seems a great waste of time and means to give some superficial chemical teaching to tens of thousands of workmen on the remote chance that one of them may gain some real benefit from it, while at the same time many hundreds of educated men are receiving a really efficient training in the same direction, many of whom cannot find properly remunerated places owing to a great extent to the cheap labour of "bottle-washers."

Another outspoken word and I have done. Bodily exercise is an excellent thing; we all

know *mens sana*, &c., and *sport* is a first-class inducement to bodily exercise. But even a good thing, pursued to excess, turns into its opposite. No sane person denies this in theory; everybody agrees that sport is not the only object of human life, and should be carried on in moderation. The question is only as to the point where to leave off. I have already heard many voices of Englishmen complaining that sport plays much too great a part in English education, and in English life generally, and that England cannot expect to keep up with other nations in science, arts, manufactures, and commerce, if not merely most young persons, but their parents and sometimes even their own teachers, continue to consider "book-learning" (including laboratory work!) as subordinate to proficiency in one or more kinds of bodily exercise. Nobody denies that all work and no play makes Jack a dull boy; but surely all play and no work makes him far duller, and even too moderate a dose of work with his play will not do for him in the long run. It is not for me to say how far those voices are in the right, and where the line should be drawn between mental and bodily education; that must be done by Englishmen for themselves, and they must abide by the consequences.

Professor SILVANUS P. THOMPSON, F.R.S., said he could not speak either as a chemist or as a teacher of chemistry; but, as Director of the Finsbury Technical College—which had been founded by the City Guilds, and which had been at work teaching not only chemistry but other subjects for more than 15 years—he thought he had had opportunities, at any rate of forming some sort of judgment of the nature which such teaching should have, and, he might add, that in speaking upon this point he also spoke for Professor Meldola, the professor of chemistry at their college, who, before holding that position, had a large experience in the manufacture of aniline dyes, and so forth. He took it that there were four purposes for which chemistry was taught in the various schools or institutions, which came within the four corners of the papers which had been read. In the first place, it might be taught in the schools as a portion of the general scientific training—as a portion of modern education. Secondly, it might be taught as a preliminary scientific training, not for the chemical industry, but for such professions as chemistry and pharmacy. The teaching of chemistry for these professions, naturally, might be conducted on somewhat different lines from the teaching of chemistry in the first category, or as distinct, on the other hand, from the teaching of chemistry for the purpose of the true chemical industries. Then, thirdly, there was the

teaching of the chemist who was to take his place amongst the chemical industries—and he took it that the papers of Professors Witt and Lunge had been devoted exclusively to that aspect of the matter, and that they did not take into their purview the two preceding purposes he had mentioned. He also thought that Dr. Gladstone had dealt almost exclusively with the teaching of chemistry for the first of the purposes, and Professor Armstrong had devoted his remarks mainly to the first two. Fourthly, he maintained that there was scope in our institutions for the teaching of somewhat more specialised chemistry, because chemistry was wanted not only for the direct chemical manufactures, but those of less direct connection, such as tanning, where chemistry was the basis of it, and yet the chemistry wanted by the tanner was not of the same kind as that given in the training of the chemist who was a manufacturer of dye stuffs, or connected with bleaching, or any of the great chemical industries. He wished to confine his remarks to the two last and higher branch of training. He thought they all agreed with Professors Lunge and Armstrong, that a training in research was absolutely necessary to all those who went into chemical industries, but they ought also to agree with Professor Witt, that it was not wise that research should be taken by students too soon, before they had been taken through what might be called a good "all round" course in chemistry. In Germany it was quite a common thing for the students to spend not one or two, but five or six, or even seven years in the laboratories of the polytechnics, and consequently that which might be all right for students who had seven years to devote, might be entirely wrong for those who only had three years in the corresponding English institutions, and it would be well if it had been more clearly stated by Professor Witt, in warning them against too early research, at what precise period during the possible seven years he regarded as an "early period." One opinion was common to the papers, both of Dr. Witt and Professor Lunge, for they both insisted that he who was to be trained to go into the chemical laboratories as a trained chemist, should be trained not only in chemistry, but also in physics, mechanics, and engineering. In their own institution at Finsbury they had some difficulty in persuading the students to take any more interest in these allied subjects than was barely necessary to fulfil the curriculum. This was greatly to be regretted, as many of the chemical operations in manufacture were almost as much matters of engineering as of chemistry. Referring specially to such industries as tanning, glass-making, and dyeing, it seemed to him, in spite of what the authors of some of the papers had said, that there was room for institutions in which technical chemistry in its more restricted sense, as applied to one or more of these industries, might very profitably be taught. He believed that the Tanners' School at Bermondsey, sustained by the Leather-sellers' Company, was doing an exceedingly useful work for the



tanners' trade in London, and in Bradford, Huddersfield, and Leeds, an admirable work was also being done by the teaching of technological chemistry in connection with the production of dye-stuffs, and in the application of chemistry to the textile industries. He thought it would be a mistake that it should go forth from this Conference that higher training in chemistry should only be of one kind. He believed there was room for the teaching of true technological chemistry of the kind he had described, and that it would be best carried on not in those comprehensive institutions somewhat incongruously described as "schools of university rank," but rather in those which might be described as mono-technic institutions.

Mr. Alderman THOMAS SNAPE, speaking as one having had something to do with technical instruction in Lancashire, advised that they should insist upon making chemistry an indispensable subject in all technical teaching, and, if possible, they should induce the Education Department to make it a general subject—a class subject, in all elementary schools. He was not, however, quite sure that he agreed with Professor Silvanus Thompson in the view that it might be desirable to have mono-technic schools, although when, as in the case of Bermondsey, they had a special locality devoted to a special industry, it was undoubtedly the best thing to have an institution devoted to that particular branch, mono-technic and not polytechnic. At Widnes, a district largely devoted to the alkali industry, naturally chemistry was a prominent subject, but there was also a large copper and metallurgical industry springing up in the neighbourhood, and in a case like that it would be impossible to set up a mono-technic school for one subject. There might, however, be several branches, allowing the student afterwards to proceed to that branch which dealt with the subject in which he was most interested. He was particularly interested in Professor Lunge's paper. The professor had been for some time the manager of a large alkali works on the Tyne, and he knew no greater authority on technology than he was, but whether the system advocated by Dr. Witt, of teaching from the effect to the cause was better than the present system of proceeding from cause to effect in the teaching of chemistry he would not venture to say. He understood him to urge that the demonstration should be first exhibited to the student and the lecturer should then proceed, from the demonstrated effect, to show the cause. It was the same principle as that now adopted in the teaching of modern languages, of teaching them orally first, and then allowing the student to master the grammar afterwards. But it was necessary to the comprehension of results that the chemical formula should be known, and therefore the theory should be taught. It was also absolutely necessary that in the teaching of chemistry, other branches of science should be taught therewith. He noticed that Professor Witt said, in his paper, with reference to chemistry, that "it was not the methods of execution

which underwent change so much as the principles upon which they were based." As an old chemical manufacturer, he would have taken quite the opposite view. He spoke with great deference in reference to any view advanced by Dr. Witt, but in the alkali industry principles were known, and the difficulty was to put them into practice for commercial purposes, so as to make them a commercial success. It was only by the application of physics, by which the requisite plant was devised, that many principles, long known to chemists, were put successfully into practice. Mr. Snape gave examples of various processes of manufacture in which commercial success had only been possible by the discovery of the precise mechanical and engineering methods which were necessary to put the theoretical principles into effect. Therefore, he could not see how it could be said that it was not the methods of execution that changed, so much as the principle. So far as his experience went, the difficulty of manufacturers was to get their principles put into practical application, and to do that they needed the knowledge of physics and of engineering and technology, which Dr. Lunge, from his practical experience as a manufacturer, and since as a professor at Zurich, so very properly advocated. When his son went to Berlin, to study under the late Professor Hoffman, who asked him this question, "Do you want to be a chemist, or to develop that chemical knowledge which you already have for the purpose of applying it to any particular form of industry?" If he had said he wanted it to assist him in the manufacture of dyes, they would practically have given him little assistance, but when they found he wanted to pursue the study of chemistry for its own sake they gave him every facility. There was no doubt that German chemists obtained their success by getting as thorough a knowledge of the subject as possible, and then trusting to the openings that might present themselves for the application of that knowledge to various forms of usefulness. The question of research demanded much more attention than it had received from English chemists, and it was in that department that the Germans excelled. The illustration given that morning, by Sir Henry Roscoe, of the large colour works where so many eminent chemists were employed was an apposite illustration of his point. The German chemists, in chemical manufactures, tried in their research work to get definite results bearing upon the particular industry with which they were connected, and it was because of that fact that Germany was able to supply its manufactures to countries that should be able to supply themselves. There was no inherent defect in our own people which would not allow them, if the same methods were employed, not only to be abreast of Germany, but even ahead.

Mr. PARKER RHODES said one difficulty under which we laboured was that in all other languages except our own chemistry meant one thing and

pharmacy another. A Select Committee of the House of Commons was at present sitting in order to ascertain how it was possible to lessen the danger of petroleum as an illuminant or heating power. That committee had been sitting for three Sessions, and they had not been able to come to any conclusion.

Dr. ERNEST H. COOK wished particularly to refer to the paper of Dr. Gladstone, which had dealt with the teaching of chemistry in evening and continuation schools. He (Dr. Cook) had taught chemistry for a considerable period, and had also endeavoured for some time past to introduce it as a subject into the Board schools of Bristol, and he agreed with Dr. Gladstone as to the difficulty of introducing it into the Board schools of the country. He thought the great difficulty was not owing to the want of ability on the part of teachers in the Board schools or elementary schools, but owing to the very great fault which not only affected the teaching in elementary schools, but the teaching in those schools under the control of the Science and Art Department, and that was what he might call the "overcrowding" of the syllabus. It was evident to any one who had had practical experience of teaching in those schools, that the amount of work required by the inspectors or examiners was far too much for any honest teacher to get through in the time that was devoted in evening schools to the work of teaching chemistry. It was too much to expect a teacher to get through a syllabus which practically embraced the whole field of elementary chemistry, as required by the code of the Science and Art Department—if the teacher illustrated his teaching, as he ought to do, by well thought out and devised experiments. He hoped that one result of this Conference would be to place in the hands of science teachers, and especially teachers of chemistry, throughout the country, some power to modify their syllabus, not only, as mentioned by Professor Silvanus Thompson, to meet the varying requirements of different localities, but also to give them a certain amount of elasticity as to the manner of teaching. In Bristol, where they had tried to get it introduced in the Board Schools, the teachers would have none of it—they hadn't the time. In other words, it didn't pay, because they could not get the inspectors to appreciate the amount of work necessary to be put into the subject if it were properly taught, and hence it came about that in Bristol they had not one elementary class devoting itself to the subject. Turning to another point, Sir Henry Roscoe had undoubtedly put his finger upon one of our weaknesses when he said that the manufacturers of England required education, as well as elementary teachers or artisans.

Dr. J. T. DUNN thought that Dr. Armstrong's paper was to be commended for not confining itself to the teaching of chemistry merely, but for contemplating the teaching of general science. If a chemist had received such a general school training, then it

would be only a matter of degree how much further he should go on similar lines before specialising himself for any particular industry or avocation—either as a chemical manufacturer or as a teacher in such a mono-technic institution as that at Bermondsey. He assumed that there would be no difference of opinion as to the value for any one who contemplated going into a chemical industry of a knowledge of engineering. Besides those processes to which Mr. Snape had referred, there were many others, the Chance-Claus process of sulphur recovery, for example, for the satisfactory carrying on of which such a knowledge was indispensable, and in which the adaptation of the plant to the object in view was the whole secret of the commercial success of the process. He had had experience on the same river as Professor Lunge, and in those days the least important man in a chemical works was the chemist. The chemist was always a subordinate sort of individual, and one scarcely knew what he was, except that his salary did not amount, as a rule, to more than £50 a year. The manager of a works was as a rule not a chemist at all, but an engineer. Now, the chemical industry of the Tyne was not in the same flourishing condition as formerly, and he thought that fact was not unconnected with the fact that managers of chemical works used to be not chemists, but only engineers. But they would err equally in the opposite direction if they trained, as managers of works, chemists who knew nothing of engineering.

Dr. KIMMINS was much impressed by what Professor Silvanus Thompson had said of the necessity for higher technical education, as in the discussion that point had been lost sight of. The committee which had sat upon that subject in connection with the Technical Education Board of the London County Council had issued a very important report, in which the views of Professor Thompson were exactly expressed. The committee consisted of such experts as Sir Philip Magnus, Professor Ramsay, Dr. Russell, and Dr. Ludwig Mond. In that report occurred the following recommendation:—"That for a certain class of adults there is a need for instruction in certain branches of chemistry, the understanding of which is of direct use to them in their occupation, and that the teaching of chemistry in its application to any industry should be concentrated as far as was possible in a small number of institutions, which should be thoroughly equipped for the purpose and placed under the direction of experts, as in the case of the Leather-tanning School at Bermondsey." That school had been a great success, and further applications for admission had had to be refused; and that the employers appreciated it was proved by the attendance of foremen of works there. Dr. Armstrong rejoiced in the success of the teaching of chemistry in elementary schools which had taken place in London, but it was a very remarkable thing indeed that so few people were attracted to the evening continuation schools in that

subject. Dr. Gladstone had pointed out that fact, but the difficulty might be met in the manner which Mr. Cook had suggested that afternoon by some alteration being made in the syllabus. In 1892 he had to inspect the secondary schools in London for the purpose of Mr. Llewellyn Smith's report, and the teaching at that time was far from being of a satisfactory character—largely due to the imperfect equipment of the schools for practical work. The science teacher was often abused, but it was nearly always a case of the limitations of poverty, for they could not teach chemistry unless they had properly-equipped laboratories. The Technical Education Board of the London County Council had equipped 24 laboratories, and provided accommodation for 3,000 students, and the result was that a large percentage of students were now doing good practical work, in both physics and chemistry.

Mr. G. N. HOOPER noticed that Professor Lunge rather deprecated the technical teaching of workmen, but he thought they should rather try by such teaching to remove their prejudices, which were really a considerable impediment to progress. As a member of the Commercial Education Committee of the London Chamber of Commerce, he had found that they could get a fair number of students, and competent teachers, for higher Commercial Education, but they were hampered by the apathy of the manufacturers and merchants, and if that Conference could awaken both manufacturers and merchants to a sense of the importance of this subject it would not have met in vain.

Mr. C. T. MILLIS regretted that more had not been said upon the question of teaching chemistry to workmen. He was particularly interested in that matter, inasmuch as he might claim to have taken some trouble in assisting in the formation of the Bermondsey School. Their work there was divided into two parts—day classes and evening classes. At the evening classes every encouragement, by low fees and suitable hours of attendance, was given to workmen and foremen engaged in the tanning yards at Bermondsey. He would like to have heard from competent authorities some expression of opinion as to whether they were doing wrong—personally, he did not think they were—in encouraging the teaching of applied chemistry to the actual workers in a particular industry. They were perfectly willing to admit that a longer time might be spent in day classes by the sons of employers, and probably better scientific results might accrue from that. At the same time they also felt that beneficial results might accrue to an industry if the workmen were encouraged to try and learn something of the principles which underlaid the practice of the industry in which they were engaged, and he was glad to point out that whilst the sons of employers attended their school fairly regularly, the foremen and heads of departments were allowed "time off" in order to go into the laboratories and pursue certain research

work. It was an important point to consider whether they should endeavour to teach scientific principles up to a certain point to those who had not been engaged in any industry or in any works, or whether they should teach the principles of science to those who had already been engaged in the works. They had now found, in connection with the printing trade, that the master printers were awakening to the importance of the subject, and now allowed their apprentices to leave work in order to attend the classes at 5.30 instead of their coming, tired and incapable of work, at eight o'clock in the evening. At the commencement of the school at Bermondsey not the slightest encouragement was received from any manufacturer in the district except one, but as it had gone on, and employers had seen the benefit likely to result, and had become assured of the good work which they could accomplish, they had awakened to the value of the work. He agreed that there was a great amount of apathy amongst manufacturers, and had it not been for the generosity of the Leathersellers' Company their excellent and successful school at Bermondsey would not be in existence to-day.

Dr. L. T. THORNE, speaking as one having had the advantage of research training in Germany and England, and having had some knowledge of educational work in England, and now engaged in technical work, would like to enter a plea for research work in connection with higher technical education. He also considered, with Professor Thompson, that they should divide the work, and recognise that there are different grades of technical education. For certain classes of workers in different industries specific teaching in the technical work of their own industry was most valuable, and this fact not only justified, but rendered necessary the establishment of special schools, or "mono-technic" institutions in certain districts where one particular industry existed. But besides this lower grade technical education it was, in his opinion, of vital importance, to recognise the need of breadth of training in the higher grade technical education, and especially the need of training in scientific research. He had been for some years engaged in two large works, where he had been allowed a very free hand (and not cramped in the way most works-chemists were by previous speakers said to be), and he had found no part of his training of more value than his experience in scientific research. He fully recognised the absolute need for training in physics, engineering, &c., for anyone intending to become a technical chemist or works' manager, but of even greater importance he considered the training in scientific research. It was to the latter that a man owed his power of grappling with the problems which faced him in the works, whether they be in the overcoming of difficulties in existing processes, the improvement of such processes, or the initiation of new ones. This was not only a *prima facie* opinion, it was his own personal and practical experience in technical work.

Dr. ARMSTRONG, F.R.S., replying upon the discussion, said he would like to emphasise the remark which fell in the first instance from Sir Henry Roscoe and then from subsequent speakers, and that was that, after all, the command of the position was not so much in the hands of those who were carrying on the education of the country as in the hands of employers. We were as capable of producing good chemists as any other country, but there was no degree of certainty that their labours would be rewarded, or that a place would be found for the exercise of their experience by the employers of the country; the consequence was that we did not attract to our schools those that ought to go to them, and who do go to the corresponding schools in Germany. Such a thing as a chemist in a manufactory paid at the rate Sir Henry Roscoe had mentioned in the case of the colour manufactory in Germany was almost unknown in England. When the day came that English manufacturers respected science—that is to say, when they paid for it well—then manufactures here would prosper, but not before. It appeared to him that they were travelling outside their sphere, because he did not think the present audience was sufficiently representative to enable it to discuss the subject of the particular teaching which should be given. Of course, very much depended upon what they regarded as a definition of a chemist. One gentleman had spoken of chemists employed at £50 a year. Well, they were not chemists. English manufacturers, as a rule, did not employ chemists—they employed “testers,” and paid accordingly. A workman did not require to know chemistry at all. He required, however, just that kind of training that he could receive in studying elementary physical science, and to be able to do what he was told. “Mono-technical” schools, such as that at Bermondsey, might render most valuable service in helping to train workmen and foremen, but they could not do everything, and it was essential that those who took command of the industry should receive a thorough scientific training.

Dr. GLADSTONE, F.R.S., said that between the primary schools and the proper technical schools there came the evening continuation schools. In dealing with the latter, his object had been to show what was being done at the present time, and what had not been done, for teaching young people who gained some amount of elementary science in the primary schools, and fitting them for their various pursuits in factories or wherever they might be placed. There was no difference between what had been said by Professor Thompson, and what had been contemplated by himself, with regard to the necessity of special schools or classes for teaching special practical matters. Seeing that there was such good scientific training given in the Board Schools, how was it that there were so few who pursued their science studies in evening continuation schools? That question occurred

to him also as he was reading his paper, but the answer was a simple one. First of all, this scientific teaching in the London Board Schools had only existed for a very few years—in fact, ten years ago they might say that there was not any such teaching in London of an intelligent character. That special kind of training was only half a dozen years old, and so these boys were now only just coming into the evening continuation schools: but, more than that, out of the 450 Board Schools in the metropolis only a very small proportion as yet have gone in for this education. But as time went on there would probably be a large army of young people, trained in the elementary schools, who would come to the evening continuation schools on their way to the higher institutions.

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### THE INTERVENTION OF THE STATE IN SECONDARY TECHNICAL EDUCATION.

BY GILBERT R. REDGRAVE.

While as early as 1833 the State had begun to foster primary or elementary education and to assist it with grants from the public funds, it was not until many years later that the claims of secondary or intermediate education entered the sphere of practical politics. It is true that, owing to the appointment of the Select Committee of the House of Commons in 1835, the art education of this country was aided from 1836 onwards by annual Parliamentary grants, which, beginning in the latter year with a sum of £1,500, amounts at the present time to a total of little short of £320,000 per annum, by far the largest part of which, however, is allotted to the teaching of drawing in elementary schools. General science teaching was first rewarded by Government grants in 1859, and the sum set apart for the science education of the country for the present year amounts to nearly £200,000, disregarding for the time being the large sums received for this purpose under the Local Taxation and Excise Act of 1890.

In the admirable “Historical Sketch” prefixed to the recent report of the Royal Commission on Secondary Education, it is stated that it was not until 1861, when the Royal Commission was appointed to inquire into the condition of nine among the chief endowed schools of the country, that what is now called secondary or intermediate education began to engage serious attention. This Commission, presided over by Lord Clarendon, reported in 1864, while a second Commission appointed in December of that same year, the so-called

Schools "Inquiry Commission," presented its report three years later, in December, 1867. The outcome of the first of these Commissions was the Public Schools Act of 1868, while the issue of the second Commission was the Endowed Schools Act of 1869. Among other provisions of this latter Act was the appointment of a permanent body, termed "The Endowed Schools Commission," entrusted with large powers for the better government and management of schools of this character. In 1874 this body was by a subsequent Act of Parliament merged in the Board of Charity Commissioners for England and Wales. Under these public bodies, schemes for upwards of 900 schools have been framed and approved, out of a total of 1,448 endowments in this country, known to be subject to the Acts, but a considerable number of endowments, founded less than fifty years before the passing of the Act of 1869, have until now been exempt from its provisions.

The Elementary Education Act of 1870 had undoubtedly the most far-reaching effects in establishing the primary education of the country upon a sound and systematic basis, and when it becomes necessary to study the question of more advanced instruction, the recent tendency of certain of the public bodies, created under that Act, to provide education for children beyond the limits for which the primary schools were originally designed, must receive careful attention. Schools of the type known as "Higher Grade," "Higher Standard," or "Seventh Standard Schools," have been established in certain of the large towns with the avowed intention of taking up the work of education to a point beyond that at which the elementary school leaves off. As is well said in the Report of the Secondary Education Commission, "these schools, though they have received the name of 'Higher Grade Elementary,' are really secondary in their character, so far at least as regards their higher classes, in which instruction beyond the Standards is given." As these schools can only share to a very limited extent in the grant distributed by the Education Department, they are supported partly by the fees of scholars, but mainly by the grants of the Science and Art Department.

This brings me to the consideration of the principal Government agency for the promotion of secondary and technical education in this country, namely, the operations of the Science and Art Department, and in this connection I desire to speak more particularly of the work of the Organised Science Schools called into

existence under that Department. The State first took a part in diffusing a knowledge of the arts and principles of design among the people (especially the manufacturing population) of the country by the establishment in London in June, 1837, of the Normal School of Design. In 1840 the Government decided to extend their assistance to the manufacturing districts, and authorised a grant of £10,000 towards the formation and equipment of schools of design in certain of the larger provincial towns. Ten years later, in 1850, when considerable changes had been from time to time introduced into the management of the school in London, there were sixteen provincial schools of design in Great Britain and Ireland, with about 3,000 pupils under instruction, and in 1852 a so-called Department of Practical Art was called into existence under the Board of Trade to administer these schools, and to promote and foster the general art education of this country. A year later the new Department was much enlarged in its scope, and became from thenceforth known as the Department of Science and Art.

This state of things continued until February, 1857, when the Education Department was constituted to include (a) the Education Department of the Privy Council Office, and (b) the Department of Science and Art, and these two departments were placed under the Lord President of the Council, assisted by a Vice-President of the Committee of Council on Education. It will thus be seen that the Department, originally organised to deal with the art work of the country, was subsequently entrusted with administrative machinery by which grants are distributed in aid both of science and art. Its annual grants, began as we have seen, to be made as far back as 1837, and though these grants were not originally made to schools, except such as those in which art alone, or later those in which science in conjunction with art was taught, yet, as pointed out in the Report of the Secondary Education Commission, the tendency of more recent "legislative and general changes in education has been to render them grants to scholars in schools."

The work of the Science and Art Department and the syllabuses of its examinations originated with the requirements of the art school, the art class, or the evening science class, and the examinations have from time to time been modified to make them more generally applicable to the needs of scholars in schools, rather than to those preparing for an art

designer's career, or to those attending the night classes at mechanics' institutions and schools of a similar type for whom they were, as already stated in the first instance chiefly intended. It is, indeed, largely owing to the new type of students taking advantage of its grants in the higher grade schools in provincial towns, to which reference has already been made, as also in endowed schools or grammar schools, that certain recent developments in the work of the Department, culminating in the establishment of the so-called organised science schools, have been introduced, and it is to this aspect of its operations as bearing on a State system of secondary education that I desire to chiefly dwell upon the present occasion.

At the very inception of the scheme of State grants in aid of science teaching in 1861, there were ready to hand, besides the isolated classes in architectural and engineering drawing, physics, and chemistry in some of the chief mechanics' institutes, a certain number of schools scattered through the country in the nature of engineering schools, navigation schools, or trade schools in which a considerable amount of time was devoted to science teaching, some of these schools being due to the early action of the Department, from 1853 onwards, and these were prompt to avail themselves of the examinations and grants offered to them by the Science and Art Department. In the course of time, as teachers became trained, classes in the various subjects of science were multiplied, being very largely in the nature of evening classes, and one of the reproaches levelled against the work in connection with South Kensington was the sporadic character of many of these classes and the want of continuity and completeness in the course of study pursued by those who were trained in them.

The chief attempt to remove these objections was the institution of the "Organised Science Schools," or secondary schools in which a definite course of science work was enjoined, and in which the curriculum laid down was such as to ensure a due sequence in the subjects studied and in the correlation of one branch of work with another.

The name adopted for the schools of this type, though it is sufficiently explanatory of its object, is not free from objection, being no doubt cumbersome and in some of its applications misleading, but as the appellation in question is about to disappear we need not now discuss it further.

Various advantages in simplified registration and in capitation grants were held out to induce

school authorities to avail themselves of these special schemes, and the organised science schools under the Department have steadily increased both in number and in importance. Very early in their history, it became manifest that these schools would embrace institutions which were originally of widely differing types, for while, on the one hand, the scheme was adopted by many of the higher grade schools, to which attention has already been drawn, frequented almost entirely by ex-standard scholars of the public elementary school, the course was shown to be readily applicable to the modern side of the grammar school, and, with slight modifications, to the day technical school of still more recent growth. The tendency in the grammar school was to press for a reduction of the time devoted to the science and art teaching, and in the technical school the literary teaching was in some cases brought down to the vanishing point. It soon became evident that schools of this character, conducted upon the lines laid down by the Department, were admirably adapted for the education needed by the middle classes of our large manufacturing towns, and that by the introduction into the prescribed courses, of certain modifications, such schools might become the State secondary schools of the future, carrying on to its necessary conclusion the excellent education afforded by the best Board schools, and serving to provide such a groundwork in science as would furnish the soundest possible preparation for the technical high school, or science university. My intention is now to indicate how these various aims are provided for in the amended curriculum of the State science school.

The Secondary School Commissioners in their recent report, have well defined secondary education, which is inclusive of technical education, as "education conducted in view of the special life that has to be lived, with the express purpose of forming a person fit to live it." A good type of a school providing this education, is stated to be "less literary than the grammar school, less theoretical than the science school, and distinguished from both by its functions being mainly industrial." The modern science school, as I understand it, draws its population from the lower middle classes, almost entirely from the children of parents who cannot afford to keep them at school beyond the age of 18. In the case of a very small number of its students provided with bursaries and scholarships, or the children of more well-to-do-parents, it may be pos-

sible to proceed to the technical college, but the large majority of the students will end their education here, and will quit the school to earn their own living. This fact must limit the course, in most cases, to three years, but it becomes possible, by the provision of a fourth year's course, to meet the requirements of those who will matriculate for the university, or who will complete their education at the technical college.

The work of the so-called elementary course of the science school is designed to extend over two years, during which a thorough progressive course of education in science, combined with literary and commercial instruction, must be given. It is an important feature in this part of the scheme that students whom the inspector reports to be unfitted for the work will be excluded. The elementary course, as laid down in the Directory of the Science and Art Department, comprises five obligatory subjects of instruction, namely, mathematics, elementary physics, including the fundamental principles of mechanics (theoretical and practical), elementary chemistry (theoretical and practical), free-hand drawing, and elementary practical geometry. It is stipulated that, while the course may extend over two years, all the subjects must be taught in each year, the instruction in the second year being more advanced than that of the first year. It is intended that the teaching should be such as to form the basis of future studies in science, and the students, during this part of their education, are not submitted to examination, but their work is tested by the inspectors of the Department in the course of frequent visits. Not less than 13 hours per week must be allotted to the instruction in the above obligatory subjects of science and art, eight hours of which must be devoted to the teaching of subjects other than mathematics, and not less than 10 hours per week must be set apart for the literary subjects, which may include two hours given up to manual instruction, or in the case of women students, to cookery and needlework. It will thus be seen that 23 hours per week must be devoted to subjects of the time-table, over which the Department exercises direct control, and further regulations apply to the length of the lessons, the number of students under each teacher, the marking of the registers, and to other matters of detail which need not here be specified.

On the completion of the elementary course, the intention is that the work of the students should be specialised in one or other of a

series of advanced courses, several specimens of which have been drawn up suitable to the needs of students who may desire to devote their attention either to physics, mechanics, or biology. It is pointed out that other special advanced courses, such as for mining and agriculture, may be sanctioned, but it is necessary that they should be previously submitted to the Department for approval. In all these courses a considerable amount of latitude is allowed to the teacher, provided the instruction is sound, satisfactory in amount, and combined with proper practical work. In the case of the advanced courses, certain obligatory and optional subjects are laid down and, as in the elementary stage, sanction is given to extend the work over two years, but the second year's curriculum must be submitted to the Department for approval. During this second year the time devoted to literary subjects and manual instruction may be curtailed to six hours per week.

The education of women students is specially considered, and in their case instruction in certain subjects of biology may be substituted for physics in the elementary course, and where this is done a special advanced course has been drawn up for their use. In many of the existing schools both sexes are being taught together with excellent results.

A liberal scale of payments has been devised for these schools, based partly upon capitation grants upon individual attendance, partly in the form of a variable grant dependent upon the result of inspection and partly as a grant for practical work done in suitable laboratories. In the case of students in the advanced course, payments are made upon the results of examinations conducted by the Department in the ordinary subjects of science and art, and payments may also be claimed on account of manual instruction or for the needlework and cookery of the women students.

It has been found that in a well-equipped science school, properly staffed, and attended by students of suitable age, who have been carefully trained in accordance with the prescribed syllabus, that grants averaging from £4 to £6 per head can readily be earned, and it is estimated that schools coming under the scheme can in certain cases obtain in grants more than three-fourths of the total expenditure per scholar. Of course it is not intended that the State should pay the entire cost of this education, but it has been publicly stated that in certain of the higher grade schools the grants from the Science and Art Department are

sufficient to cover all the expenses except the rent.

From this brief outline of the regulations for these schools it will, I think, be evident that we have here all the conditions needful for the suitable training of the large majority of the young people of both sexes in the country, who would in the natural course of events enter the secondary school. In the case of a relatively small proportion of the children of the upper middle classes, who may look forward to entering the university, there is the classical training of the grammar school and the public school, existing upon lines which have been pursued from time immemorial, and concerning which I have no desire to speak at the present time, but the curriculum of the grammar school is eminently ill-fitted for modern requirements and for the training of the vast majority of the children of the middle classes who have to look forward to an industrial or a commercial career. Something of the nature of the German *Real-Schule*, but with a far larger proportion of practical science work and manual training should, I am convinced, serve in the future as our model for the secondary school in this country, and I believe that it is quite possible to expand the scheme of the State science school, such as I have described it, so as to embrace all those branches of a modern education, whether literary, scientific, or commercial, which can possibly be required by young people between the ages of fourteen and eighteen. I look forward to the time when each large manufacturing town, and every county town of importance, will possess its State-aided and State-inspected modern school, and I am convinced that in the organised school which I have attempted to describe we have all the necessary elements of the institution in question. Each of these schools will of course be adapted in its details to the special needs of the locality in which it is situated.

I have purposely avoided all mention of the details in the work needed for different types of schools, but it would be easy to show that in the case for instance of a commercial or an agricultural school, certain readily introduced modifications in the curriculum would convert

this or that section of the school in the one case into an agricultural division, in the other into a commercial school. For schools of the latter type we have excellent models in Antwerp, Vienna, and certain other continental cities, where the youth is trained to be a clerk almost as if he were in the counting-house of a merchant's office. He sends and obtains samples, analyses them in the school laboratory, tests their relative values, fixes the prices, sends invoices and corresponds with imaginary agents, manufacturers, and travellers, in several languages, and he sees in the school museum fine collections of commercial produce from every part of the world. We have really no example in this country of a commercial school established on modern lines. Agricultural schools already exist in England and will furnish useful types of the class of changes which will have to be introduced in the syllabus in order to render the State-aided school suitable for a specialised training in agriculture.

There are many other directions in which the school or sections of the school may have to be modified, since it is quite evident that no narrow or rigid curriculum would suit every case, and to my mind the great value of the syllabus consists in the obligatory nature of a fixed amount, both of literary and scientific instruction, with the power to take up other voluntary subjects capable of giving a special direction to the work of the school.

I wish it to be clearly understood that I have purposely here omitted all reference to the other directions in which the State intervenes in order to aid the science and art work of the country, namely, in the system of evening classes and in the fully equipped school of art or in the simple art class. The art work may be disregarded, as it forms but one small branch of technical education. The science work, however, stands in a wholly different position, and the training in practical science and in manual work, which has been largely stimulated by State grants, must, I think, be regarded as among the most important and valuable of the results of State intervention in secondary technical education.



## WEDNESDAY MORNING, 16TH JUNE.—SECTION A.

Major-General Sir JOHN DONNELLY, K.C.B., in the chair.

## THEORY AND PRACTICE IN TRADE TEACHING.

BY SIR PHILIP MAGNUS.

Of the City and Guilds of London Technical Institute.

The experience acquired during the few years since technical instruction was first generally introduced and made supplemental to trade practice, has enabled us to formulate certain principles applicable to the teaching of trade subjects. The material now exists for a new chapter in Pedagogy, which, if not yet written, may at any time be added to the science of education. The difficulty of determining the true relation of theory and practice in teaching the technology of any trade is shown by the Regulations of the Science and Art Department which apply to the teaching of science in its bearing upon trades, and in the Technical Instruction Act, which expressly forbids the teaching of the practice of a trade in any technical school. The words of the Act are, technical instruction "shall not include teaching the practice of any trade or industry or employment."

It has become a recognised principle of technical training that a trade is best learnt by actual practice in the factory or shop, and so strictly has this principle been adhered to, that the establishment of schools similar to the Apprenticeship Schools of France and the *Fachschulen* of Austria and of other countries has been discouraged by the best authorities on the question of technical education. Nevertheless, it has been found necessary to approximate so closely to the teaching of a trade in some of our technical classes, that local authorities have frequently been in doubt as to whether they have infringed the Act, and the Government has been obliged to give a very broad and liberal interpretation to it, to satisfy the just and proper demands of technical schools.

There is also considerable difficulty in indicating the kind of theory to be taught in a trade school. The courses of instruction prescribed by the Department in the Directory for science were intended to meet the require-

ments of students engaged in different sections of industry. But, although such courses of instruction have been largely followed by all kinds of artisans, a protest has been continuously heard that the syllabuses of instruction are ill-adapted to the workmen's needs; and we know that the instruction has failed to reach thousands of workers in some of our largest and most important industries. This fact was brought prominently under my notice when I was asked, sometime since, to ascertain what proportion of the candidates at the technological examinations succeeded in qualifying for the full certificate by having passed certain examinations in allied branches of science under the Science and Art Department. The inquiry showed that less than 17 per cent. of the successful candidates were so qualified, and in some industries, notably in the textile trades, the proportion was much smaller. It appears, therefore, that for the purposes of technical education, more particularly as adapted to workmen, special methods have to be considered even in the teaching of the theory, or principles of science underlying the practice of any trade.

One of the most interesting papers it has been my privilege to read, is an article contributed to the *Edinburgh Review* in 1824, which shows how clearly its distinguished author, the late Lord Brougham, foresaw many of the difficulties we now experience. Lord Brougham, in the article to which I refer, quotes with approval from the prospectus, published in 1821 by the Edinburgh School of Arts, the following passage:—

"The great object of this Institution is to supply, at such an expense as a working tradesman can afford, instruction in the various branches of science which are of practical application to mechanics in their several trades, so that they may the better comprehend the reason for each individual operation that passes through their hands, and have more certain rules to follow than the mere imitation of what they may have seen done by another. It is not intended to teach the trade of the carpenter, the mason, the dyer, or any other particular business; but there is no trade which does not depend, more or less, upon scientific principles; and to teach what these are, and to point out their practical application, will

form the business of this establishment. He who unites a thorough knowledge of the principles of his art with that dexterity which practice, and practice only, can give, will be the most complete, and probably the most successful tradesman."

It would appear, however, that more specialised instruction having been required, the students at the mechanical lectures of this school proposed to form themselves into separate classes, and they selected a working joiner, by name James Sale, and David Dewar, a working cabinet-maker, from among their fellow-students to give instruction. But even this arrangement was not free from difficulties, and Lord Brougham goes on to say: "The experience of the first year, and particularly the fact that the students were of no less than forty-eight different trades, convinced the directors that the best plan was to limit the lectures to the general principles of those sciences which are of universal application to the arts, and not to attempt, as had at first been intended, teaching the principle of the arts in detail."

Here the matter was left. The City and Guilds Institute has been trying during the last 17 years, with I hope some success, to solve the problem which was left unsolved by Dr. Birkbeck, Lord Brougham, Mr. Galbraith, and other pioneers of technical education. At the Edinburgh School of Art it was finally arranged that the lectures should be "strictly confined to such objects of science" as would be "useful to workmen *in the exercise of their trade*," and if we adopt this principle we cannot go far wrong.

I cannot hope, in this short paper, to treat with any attempt at completeness what may be called the methodology of trade teaching. I can only throw out a few suggestions, and indicate some of the difficulties it involves. The subject, however, is well worthy of the careful consideration of the educationalist as a problem full of interest and of great importance.

Let us consider, first of all, the extent to which practical work may legitimately enter into trade teaching. Now there are certain branches of trade and certain circumstances and conditions in which, notwithstanding all that may have been said to the contrary, the apprenticeship school—that is, a school in which the practice of a trade is completely taught, is a useful and almost a necessary institution. In many art industries this is so. An apprentice will learn wood-carving far better in a school than in a shop. The art requires no expensive tools, to be obtained only

in the shop, and the supervision and suggestions of the school teacher afford help which the young apprentice cannot equally well obtain in the commercial shop. Of engraving and inlaying, of metal-chasing and enamelling, of china-painting, basket-making, embroidery and artificial flower-making, and of very many other "arts and crafts" as they are commonly called, the same may be said—that the practice of the trade may properly be taught in school. Then, too, an apprenticeship school often affords a very useful, if not the only means, of introducing a new or of recovering an old industry. In a country like Ireland, where trade has languished, the establishment of such schools for the teaching of carefully selected trades might, and probably would prove most serviceable. In many rural districts, too, where the villagers earn a very scanty livelihood as agricultural labourers, new industries, requiring few tools and only cheap material, may be taught, thus increasing the prosperity of the district and improving the condition of the workers. In Cambridgeshire basket-making is being now so taught, and an improving trade is likely to be localised in that county. In many parts of Southern Germany similar trades are extensively taught, and the position of the agriculturist is thereby materially improved. But the instruction, in such cases, must go beyond the limitation imposed by the Act; for unless the pupils are really taught the practice of the trade, so as to be able to produce saleable articles, the teaching would fail of its purpose. There are other cases in which, it seems to me, the practice of a trade may be legitimately taught in school. My attention has recently been drawn to the fact that the tailoring trade has for many years suffered from foreign competition. I mean the competition, not of imported goods, but of imported workmen. This complaint does not apply so much to "cutters," who occupy a higher position in the trade, as to the rank and file of the work-people who are engaged in sewing and putting together the garments that are cut out for them. There seems to be at present no way of training competent work-people for this large industry. The conditions under which the work is done do not admit of anything approaching to the apprenticeship system, nor do the young people who want to learn the trade have any chance of acquiring the necessary proficiency and dexterity in the ordinary shop. The result is that foreigners are largely employed, many of whom have gained the necessary skill in a tailor's school.

Now I am told that the want of such schools is much felt in this country, and it is believed that it is only in such schools that lads can be trained as competent and efficient workmen. Yet in accordance with the strict provisions of the Act, a school of this kind would be unable to receive any grant in aid from a local authority.

The instances I have quoted are, I admit, of an exceptional character, and might be easily provided for by a clause giving discretionary powers to the central authority in the interpretation of the Act—powers which, I am bound to say, have been already wisely stretched in the best interests of technical education, by the Science and Art Department.

To the great majority of industries, however, the rule unquestionably applies that the practice of the trade is best acquired in the factory and shop, and that the instruction of the technical school should be supplementary only to the experience obtained in commercial work. By this principle nearly all our technical classes are regulated. Nevertheless, in many of these classes, something that approximates very closely to the teaching of a trade is recognised as necessary. The difference, more or less clearly defined, is, however, sufficiently marked to distinguish the practice of the shop from that of the trade school. Any one going into a technical class for plumberst printers, or bookbinders, or into the fitter's shop of a school for engineers, or into one of the well-equipped weaving sheds found in so many of our textile schools in Lancashire or Yorkshire, would be inclined at once to assert that the practice of a trade was being taught in such schools. Nevertheless it is not so, or is not necessarily so. The school is fitted with much of the same machinery and tools as is found in the factory or shop; and so indispensable is such equipment, that a large part of the machinery is frequently supplied by local manufacturers, who are themselves interested in the training the school provides. In our weaving schools are found looms of various kinds with all the incidental machinery; in our printers' schools we have founts of type; the best of our boot and shoe class are furnished with the different machines in use by those engaged in one or more of the ten or twelve sections into which the manufacture is split up; our plumbing classes are supplied with furnaces, and with the necessary tools for the joining of pipes and the bossing of lead, and so on with a large number of other trades and industries. To what end, then, are all these tools and appli-

ances employed in the technical school, if the teaching of the practice of the trade or industry is forbidden by the Act? The answer is that they are used and are required to show the student how certain processes are performed, and to enable him to perform those processes himself. The difference between the use of such tools in the shop and in the school is, that in the shop the apprentice or young artisan acquires slowly, under considerable difficulty, and frequently without any explanation of the why or the wherefore, the knowledge how to use the particular machine or appliance; and once having learnt it, he is kept working at it, so as to gain skill and rapidity of execution in its use. In the school, on the other hand, he learns leisurely how the tool is used, the principles of its construction, the errors to avoid, and the means of rectifying them when they occur, the nature of the material to be wrought, and the means of distinguishing different qualities of such material; and having learnt all this, and having acquired a certain degree of manipulative skill, he is not expected by constant repetition of the same process to aim at that rapidity of execution which is indispensable for trade purposes, but is allowed to pass on to the explanation of the use of some other machine and to the learning of some other process. It will be seen, therefore, that although a technical school may be equipped almost as completely as a trade shop, the equipment serves a very different purpose. Its object is the production of intelligent work-people, and not the production of saleable commodities. That goods may be produced is an incident only in the production of intelligent artisans. The practice a student obtains in a technical school is not intended to give him that complete mastery and rapidity of execution—the result of constant practice—which can be acquired only in the shop or factory, where work is done on commercial lines, but rather to enable him to understand the appliances of his trade, and to use them with care and judgment. Nor, indeed, can the technical school, howsoever completely it may be equipped, afford that special training in adapting means to ends, in economic working, and in the appreciation of the commercial importance of detail, and of the true value of time, which is acquired in the shop.

We see, therefore, the uses and the limitation of trade practice in technical instruction, and what the Technical Instruction Act really requires is that whilst the school shall afford, by the completeness of its equipment,

every facility, within such limitations, for trade practice, those limitations shall not be transgressed. It is in the apprenticeship school only, where efficient workers are produced—workers who on leaving the school can at once find employment owing to the skill and dexterity, there acquired, that the teaching of practice exceeds the limitations imposed by the Act.

It will be seen that the equipment of a technical school for trade teaching is necessarily expensive, even although the object of the instruction is different from the training of workmen in the practice of the trade. A large number of our technical classes are still inadequately provided with the necessary apparatus, and the instruction is consequently too theoretical, and the students lack the opportunity of applying in actual practice the principles they learn. Every year some improvement in this direction is noticed, and the requirements of our technological examinations, which are becoming more and more practical, are helping to make the teaching more practical also. In the early developments of trade teaching it was thought that the practice could be acquired in the shop, and that it was sufficient to teach the theory in the school. But it is now recognised, that whilst what we may call trade-practice may be best acquired in the shop, the application of the theory must be taught in school, and that a sufficiency of tools and appliances is needed for this purpose. The Germans whose educational perfections are so frequently referred to, are still in the elementary stage of trade teaching. But they are beginning to recognise the value of practical work and the necessity of furnishing their schools with suitable appliances, and it is only the want of funds available for such purposes that prevents many of the German schools for artisans from being as well equipped as our own.

When we come to consider what we mean by theory in trade teaching, we are also met by difficulties. It might have been thought, and indeed was thought, that ordinary instruction in physics, chemistry, and mechanics, would form the best preliminary training for artisans engaged in different trades. But experience has shown that this is not so. Artisans require to be taught by special methods those principles of science which are directly applicable to the industry in which they are engaged. This requirement makes the teaching of science to artisans a very difficult problem, and necessitates a special

training for those who are to give such instruction. For many years the City and Guilds of London Institute has been brought face to face with the difficulty of this problem. They have tried to solve it in various ways. Latterly, they have endeavoured to induce apprentices, or young artisans, to take a preliminary course of instruction in which the principles of science are presented to them in relation to the practice of their trade. This experiment in trade teaching has proved fairly successful. Preliminary courses have been arranged in electrical engineering, in which the simpler problems connected with the fitting of electric bells, and with wiring for electric lighting, have been made to give examples illustrating some of the more important principles of electricity and magnetism. Similar courses have been arranged for apprentices engaged in certain branches of the building trade. In plumbing, for example, in which subject instruction, to be of any value in supplementing the practice, must deal with the principles of science applicable to the trade, young apprentices have been found to be particularly deficient in the knowledge of scientific method. The efforts of the Institute to improve the instruction given in the numerous classes supported by local authorities, and affiliated to the Institute, have been singularly successful. The preliminary courses of instruction, judging from the attendance of apprentices, appear to have supplied a distinct want, and the teaching has been of such a kind that the experiments illustrating the principles of science with which the young plumber ought to be made familiar have been taken from the plumber's daily practice. It is only a well-trained and well-educated teacher who can give such instruction. In my address at the opening of the Finsbury Technical College, in 1883, I said: "The teacher who is to inspire confidence in his artisan students must address them in the language they understand.... Indeed, the technical teacher ought to be so constituted as to be able to keep one eye on the general principles of science, and the other on the industry which his pupil intends to follow." Where the teacher possesses this educational squint, so to speak, the instruction is found to be appreciated by the young apprentice; but teachers trained to give such instruction are not easily found.

The teaching of the theory of any particular trade will be more satisfactory, and will be attended with less difficulty, when the young

apprentice leaves the elementary school with some knowledge of experimental method and some skill in applying it. The way might be much better prepared than it is for technical teaching. The School Board for London has been doing excellent work in its science demonstrations, which will facilitate technical teaching in the future. Other school boards are, I believe, doing likewise. But the consideration of this question would take me too far from the immediate subject of my paper. I want to show only as regards the theory that enters into trade teaching, that for the purposes of technical instruction in trade subjects, the principles of science must be taught in their special application to the trade, and must be illustrated by examples with which the young apprentice is familiar, and by experiments which he would be likely to need in his ordinary work. You will see, therefore, that the teaching of the theory of any trade must be made to illustrate the practice, just as the teaching of the practice must be made to illustrate the theory. For such teaching, a sufficient supply of apparatus and appliances is a first requisite, but the machinery and tools employed in a technical school are used with different objects and with a different intention from those of the factory or commercial workshop.

The Technical Education Board of the London County Council has appointed a committee of experts to enquire into the existing facilities for technical instruction in connection with the different branches of the building trades, and as these trades are essentially practical, I hope, as one of the results of the enquiry, that some additional light will be thrown on the problem I have been considering.

Many interesting facts and conclusions have been derived from a similar enquiry, undertaken by the same body, into the best methods of teaching chemistry for trade purposes. There is, indeed, a wide field still open for enquiry and investigation by educational authorities; and whilst it is evident that the preparation of schemes of instruction must be left to such authorities, or, to quote again Lord Brougham, whilst "it is conceived that persons of education are better able to determine what course of instruction is best fitted to attain the objects in view," valuable help may be obtained from those engaged in the trade, in solving some of the problems that are still full of difficulty in trade teaching.

## THE TRAINING OF TECHNICAL TEACHERS.

BY SIDNEY H. WELLS,

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One of the most marked features of the recent development of technical education is the growth of facilities for instruction in what are termed "technological" or "trade" subjects. During the ten years prior to 1896 the number of separate classes registered by the City and Guilds of London Institute increased from 262 to 1,120; while in half that time the number of students more than doubled, the total last year being nearly 27,000. The programme of the Institute for the current session provides for examination in no less than 68 different subjects, 63 of which are directly connected with important practical industries. Large as these figures are they do not include all the subjects in which classes for imparting distinctly trade instruction are held, as nearly every technical school or institute conducts special classes suited to the particular needs of its locality. These include, for example, such subjects as horticulture and agriculture, tailoring and upholstery, artificial flower making, pattern making, smiths' work, and many others not included in the City and Guilds Institute programme. It is, moreover, certain that however large the present supply may be as compared with ten years ago, the next decade must mark an equally great advance if the trade workers of our country are really to be provided with efficient technical education.

From what has been already said it will be understood that this paper refers only to instruction in distinctly trade subjects, and not in technical subjects generally. Admission to these is primarily, and in some institutes entirely, confined to *bonâ fide* workers in the trade concerned, this qualification being compulsory for all students upon whom grants are claimed from the City and Guilds of London Institute.

The greatest of all difficulties in connection with such classes as these is undoubtedly the provision of satisfactory and efficient teachers. The larger technical institutes are often asked to recommend teachers, and cases are not infrequent where suitable men are actually brought at high prices from one town to another in order to conduct classes. In other cases advertisements have quite failed to bring suitable applicants, while it is a common condition to find the successful teacher engaged for four, five or even six evenings weekly at different institutes. Indeed it is probably the case that

many centres cannot conduct classes for want of teachers, while it is certain that many others fail to make classes successful owing to the teachers being insufficiently qualified. The wonder is not that some classes fail, but that so many have succeeded, for if any vital matter has been overlooked and neglected it is surely that of the training of the teachers.

What, then, are the essential qualifications of a teacher of technical classes?

The first and most natural is that he should possess a practical knowledge—acquired in the factory or workshop—of the subject to be taught; the second, that he should possess a sound knowledge of the elements of the arts and sciences applicable to the subject; and the third, that he should be able to impart his knowledge to others, to arrange a syllabus of instruction, to manage a class—in a word, to teach.

The first of these conditions is apparently the most easy to satisfy, and of its absolute importance there can be no question. Those who have had experience in such matters will know what great value the trade student attaches to the practical knowledge and position of the teacher, and how he is attracted by the man of recognised experience and skill, as much as he is repelled by the absence of these qualities. But here a very real difficulty presents itself. There is a growing feeling that a man cannot teach efficiently after working hard all day at his trade, the suggested remedy for which is to remove him from the factory or workshop, and let him devote his time entirely to teaching. But in doing this he gradually loses that very qualification which is regarded as essential, for he is no longer able to keep in touch with his trade, or to gain experience of its new methods, processes, or machines, and he very soon ceases to be regarded as a "practical man." This may not be of equal importance in all trades, but in the majority of cases, the loss of practical qualifications is probably only a question of time. On the matter of working all day and teaching in the evening, the author may mention that he knows six teachers of trade classes who teach from three to six evenings per week each, and in all cases after working at their respective trades during the day. Perhaps when the supply of good teachers is greater, this condition of work will cease, for it can scarcely be permanently efficient.

The second qualification—that of a knowledge of the arts and sciences connected with

the subject—does not, of course, apply with equal force to all trades, and depends also upon whether the teacher's work is limited to workshop instruction, or includes the conduct of the lecture or theory class. Such a subject as plumbing, for example, including as it does something of the sciences of chemistry, physics and mechanics, requires a wider range of knowledge than, say, plasterers' or smiths' work. The present generation of trade teachers have had to gain their theoretical knowledge in evening classes, by no means an insufficient medium, provided the course of study is sufficiently wide, properly co-ordinated, and continues for a long enough time. But how rare are the practical men who have taken such a course as this will be apparent to all who have tried to obtain them. In some of the newer subjects of trade instruction they are unobtainable, and one is forced to be content with the essentially practical man, who has never attended a class or undergone an examination. The author has had this experience in three important subjects within the last two years, and others have probably met with the same difficulty. Not that the certificated teacher is by any means always the better, or the uncertificated one incompetent. In cases known to the author the teacher of a trade class failed to pass the examination, while three of his students were successful, two of them gaining medals; and in another the class which had been large and successful under a purely practical teacher fell to pieces under a teacher whose theoretical qualifications were all that could be desired.

The author is aware that experiments have been made by the Plumbers' Company in sending selected practical plumbers for a course of theoretical training at a university college with a view to becoming teachers, but he believes the time was quite insufficient for anything like a proper course. Such a plan obviously has very much to recommend it, but the chief difficulty would appear to be in the men being spared by their employers for a sufficient length of time, while it is not improbable that they are less able to assimilate knowledge when crowded into a few weeks or months than when spread over several years, as in evening classes.

Much of what has been already said applies also to the qualification of ability to teach. How often it is that the man with ample knowledge of both theory and practice is unable to impart it to others, and fails altogether as a teacher. Sometimes it may be due to want of

interest and enthusiasm which nothing can cure, but more often it is want of method, of inability to arrange the work in its natural sequence, of too great haste and lack of clearness, and of faults in elocution, all of which it is possible to improve.

Owing to the difficulties which the author has himself experienced in obtaining suitable teachers, and the belief that the general demand for teachers was quite in excess of the supply, he has for some time given attention to methods for meeting the deficiency. At the commencement of last session he formulated a scheme for the institution of scholarships for training instructors in trade subjects at the Battersea Polytechnic. Scholarships were offered in each of the trades of bricklayers, carpenters and joiners, masons, plasterers, plumbers, and painters and house decorators. The scholarships gave free admission to evening classes in approved subjects for two, three, or four years, with the provision of text-books and materials. The holders were to be under thirty years of age, to be practically engaged in one of the trades mentioned, to promise to attend at least two evenings weekly for not less than two years, and to undergo examinations as required.

It was understood that they would receive special attention from their teachers, and that during the last year they would receive instruction in matters relating to the conduct of classes. Should occasion require, the scholars would, if qualified, be engaged as temporary instructors, and in the event of vacancies for permanent instructors they would be given the preference over other applicants.

This scheme having come under the notice of Sir Philip Magnus, he was able to obtain from the Plasterers' Company a grant of money for increasing the value of the two scholarships offered for plasterers' work, this being one of the subjects for which there is much difficulty in obtaining teachers.

Of the twelve scholarships offered only nine applicants were found suitable, namely three in carpentry and joinery, two each in masons' work and plumbing, and one in plasterers' work and painters' and house decorators' work. Two of the scholars relinquished their scholarships within a month; but the others attended regularly for the classes prescribed, underwent the examinations, and generally acquitted themselves well.

The scholarships of these seven students will be renewed next year and afterwards until they have completed the course of study agreed upon,

provided they continue to be satisfactory. In all cases they are required to attend classes in subjects of art or science connected with their trade in addition to the regular trade class, and the scholarship is only tenable while they continue working at their trade during the day. In the last year the scholars will be expected to attend classes in elocution, and to act as assistants to some senior teacher whose methods of teaching are deserving of imitation. They will also receive a few special lessons of a thoroughly practical character dealing with such matters as the arrangement of courses of study, the management of classes, and methods of teaching, and will be expected to draw up syllabuses of work, and to give practical lessons before a teacher qualified to criticise and advise. Other scholarships will be awarded in the coming session.

Of the ultimate success of such a scheme as this it is impossible to do more than prophecy, but the author has strong hopes that it will prove successful, and will produce teachers of good all round qualifications. One difficulty would seem to be in influencing the character of the work of the scholar in the workshop or factory, and in ensuring its sufficiency, but this can partly be met by selecting scholars who are employed by good firms, or something might be done by enlisting the co-operation of the employers. Considerable time is needed for such a training as suggested, but it is difficult to see how this can be avoided if the practical experience in the shop or factory is to be gained concurrently with that in the classes, a condition which the author regards as essential to success.

The author ventures to suggest that some scheme of this character might be adopted in all our large technical institutes, and that in fact it would be a good thing if at least one student-teacher could be attached to every trade class throughout the country. To further ensure its success, it would appear desirable that the scholarship awarded should include a money payment in addition to free education, and he strongly urges the consideration of this matter upon the London Technical Education Board, the technical committees of boroughs and county authorities, and other bodies interested in technical education. After all, is there any subject more important than that of the teachers who are to train the workers of this country in the scientific principles and practice of the industries in which they are engaged? The teaching of subjects of science, art, commerce, and domestic

economy is fairly well provided for, but in that of technology the demand is considerably in excess of the supply, and fortunately for our industries the demand is constantly increasing. The syllabuses of instruction and examination are gradually being widened to include a requisite knowledge of the arts and sciences connected with the industries concerned, and efforts are made to induce trade students to attend classes in certain subjects of art or science in addition to the technical or trade class. It is probably not too much to say that these efforts will largely be futile until the teachers who have no knowledge of these subjects themselves, and are not in sympathy with and often opposed to their introduction, are replaced by others who can best show the value of a thorough course of training by their own position and work, and can assist in imparting it to their students.

Mention should be made of a method of conducting technical classes which exists in some institutes where the teaching is carried on by the professional man or teacher in conjunction with a workshop instructor. For example, classes in plasterers' work, and painters' and house decorators' work would be taken by practical teachers engaged in the trades under the immediate direction and with the assistance of the art master, or classes in brickwork would be conducted by an architect assisted by a practical instructor, the lectures and general supervision of the workshop classes being undertaken by the architect. But such an arrangement is obviously somewhat costly, and its efficiency depends largely upon the training and qualifications of the art master or architect. Generally speaking, this class of teacher is wanting in practical experience, and the arrangement is obviously not adaptable to all subjects.

In conclusion, the author would desire to express regret that pressure of work has prevented him dealing with the subject with more care and detail than has been possible in this paper. He believes that the great importance of the subject will be generally acknowledged, and he hopes that its consideration by this Congress will make for the further development and success of the great work of technical education with which it is so closely concerned.

Mr. C. J. WOODWARD (Birmingham) said there was one paragraph in Sir Philip Magnus' paper to which he had paid particular attention. It was this: "It might have been thought, and, indeed, was thought, that ordinary instruction in physics,

chemistry, and mechanics, would form the best preliminary training for artisans engaged in different trades, but experience has shown that this is not so." He would be glad to hear the grounds for that statement. He had been engaged in teaching for many years, and amongst those attending his classes were many who had been engaged in trades, and it had been his experience that instruction in the principles of science—not exactly pure science, and yet science—without any special application to particular trades, had been very serviceable indeed, and he was not sure whether it had not been even more serviceable than if it had been arranged for particular trades. He presumed, for instance, that the science of acoustics would not be regarded as pre-eminently suitable for a brass-founder or electro-plater, and, certainly, the connection was not easy to see, but one of his students, an electro-manufacturer, attended a course of lectures on acoustics, and he introduced some dinner-gongs which had been very successful. To give another instance, another pupil had found that to mix certain sugars was a bad thing, because they became unsaleable. His knowledge of chemistry induced him to set to work, and to investigate the problem, and he soon found that certain sugars contained one class of impurity, and others another class, these impurities, when in contact, developing a dark compound. His remedy was to test the sugars before mixing, and take care only to mix those having a similar impurity. Was it not well to lift the workman up to the science, rather than to bring the science down to the workman?

## THE WORK OF THE CITY AND GUILDS CENTRAL TECHNICAL COLLEGE.

BY W. E. AYRTON, F.R.S.,

Dean and Professor of Applied Physics.

The author said that the Secretary had asked him to read a paper, but it was impossible for him to find time for writing a formal paper, and he had therefore been allowed to substitute instead a few minutes talk on the subject.

This Central Technical College is somewhat exceptional in its character. It is not a Government institution, nor is it supported by a municipality. It is, moreover, not a commercial enterprise, seeing that the certificate of registration especially forbids the participation of profits amongst its members, nor could it be regarded as a private concern. It is, I think we may say, the embodiment of the expression of the latter end of the 19th century—of the feeling of responsibility that exists amongst the Livery Companies of the City of London.

These Livery Companies—some of which are acting with the Society of Arts as our hosts in



summoning this Congress—in days gone by constituted themselves the guardians of the welfare of the industries of our town, and secured the freedom of the artisan of the City to practice the mysteries of his craft. To-day it is not freedom, but knowledge, that the workman and the manufacturer require in order to achieve commercial success, and so some twenty-one of these companies joined together with the Corporation of the City in forming an institution with a long but expressive name—the City and Guilds of London Institute for the Advancement of Technical Education.

Now, the Central College of this Institute in Exhibition-road, was opened in 1884 “for providing instruction for advanced students in applied science” . . . “wherein no one should be received who did not show on examination that he had acquired in some of the existing science and art schools, or otherwise, a sufficient knowledge of science and art, so as to enable him to profit by the instruction.” Consequently, from the very beginning, thirteen years ago, this Central College has had the enormous advantage of holding, yearly, an entrance examination, by means of which it has been able to weed out the incompetent from the candidates seeking admission; and, as the remuneration of no member of the College staff depends in the slightest degree upon the number of students in attendance, there is no fear that a point would be stretched to ease the entrance of a weak candidate.

The examination, in fact, has been intentionally kept fairly difficult for lads and girls of 16—the minimum age at which we admit them—it is about as hard to pass as the matriculation examination of the University of London. The subjects, of course, are somewhat different; our rules specifying that candidates must qualify in mathematics and mechanics, and pass in two of the three subjects of mechanical drawing, physics, and chemistry, whilst a knowledge of French and German facilitates the entrance of the candidate into the College. In the case of those who are competing for scholarships, there is a further test of their ability by their being compelled to pass practical examinations in physics, and in chemistry.

The fees are intentionally kept low, and produce a total amount of not half the current expenses—indeed, not a quarter, if interest on capital expenditure had to be taken into account—and there are also several entrance scholarships; so that a man, boy, or girl, being

able to become a student of this College, depends almost entirely upon his or her ability and knowledge, and hardly at all upon the social or pecuniary position of the parents.

Every year about 70 candidates are in this way admitted, and the total number, therefore, of the first, second, and third year students in attendance at one time at the College is practically limited to 200. Now, this limitation of the members is of the utmost importance, because it enables a great deal of individual attention to be given to the students in their practical work, so that when they reach the third year of the course, they are capable of carrying on experimental investigations of real utility. With larger numbers, such individual attention would be impossible, and the object of the College, for higher technical education, would be absolutely defeated.

There is another advantage which this College possesses, and that is that the courses followed by the students who are qualifying to obtain a diploma in either the departments of civil or mechanical engineering, electrical or chemical engineering, are definite and prescribed, not merely recommended to be followed, but *required* to be followed. For the first year the courses are the same for all students. In the second year there is a certain amount of differentiation, and in the third year it is almost entire specialisation—that is to say, a third year student devotes himself or herself almost entirely to the study of those subjects which appertain to the particular profession which the student has elected to follow. In special cases, where the applicant has obtained a university degree at home or abroad, or by working in a factory, or otherwise, has had an exceptional opportunity of acquiring knowledge, admission is granted without the student being required to pass the entrance examination, and a special course may be followed differing from the regular courses prescribed for the diploma students. On the other hand, however, such a *special student* is not eligible for the diploma.

As I trust many of you will pay a visit to the College on Friday afternoon next, it is unnecessary for me to describe in detail the laboratories, the fittings in them, or the special apparatus which they contain. All that I hope you will see for yourselves. But perhaps you will allow me to say a brief word regarding the research work carried out in these laboratories of the Central Technical College.

At the opening of this College the late Lord Selborne stated that “in the several labora-

ories with which this College is provided new and increased facilities will be afforded for the prosecution of original research, having for its object the more thorough training of the students, and the elucidation of the theory of industrial processes," and as a supplement to the education which a student should receive at a college in the technical applications of science, it appears to me that the experience which he gains by carrying out a research is of great value in teaching him to think for himself, and acquire habits of self-reliance. Further, his having to adopt expedients for overcoming the experimental difficulties which are met with in all original researches, trains his ingenuity, and this is necessarily of great value to one who is about to become an engineer, and who may, therefore, be brought face to face with totally new problems in practical life.

The enumeration of all the investigations that have been undertaken by the students, assistants, and professors would weary you, so I will confine myself to the list of the researches carried out during the last session, 1895-96, which is given in the report issued at the end of 1896 by the Dean of the College. The list is a long one, for it contains the titles of some forty pieces of special work, with references to the different scientific societies in whose publications the accounts of the investigations may be found, and to the fact that in one case the society publishing the research awarded the students its premium for 1896.

The enthusiasm of the students in their laboratory work is most marked; the determination to come to a definite result, to carry the investigations to a final and successful issue, is most encouraging, and any investigation that has required absolutely continuous observation, and freedom from vibration, has never failed to secure the attendance of a group of students all night, during those hours which they would otherwise have spent in bed.

But the most striking fact in connection with the students, and one which tests the value of the education which they have received, is the success which attends their entry into industrial life. You are doubtless aware that a system of premium pupilage has, unfortunately, long existed in this country, and when a manufacturer can obtain the gratuitous services of an assistant and £100 in addition—well there is a considerable temptation for that firm not to offer a salary. Further, the growth of technical institutions has been very marked during the last few years, so that the number of engineering students who are now turned out

year by year is very considerable. It might, therefore, have been expected that, year by year, those who complete their courses at the Central Technical College would experience greater and greater difficulty in securing berths at the completion of their course. And some years ago, when technical institutions were coming into existence at a more rapid rate than even one's most sanguine expectations could lead one to expect would be justified by the need for men to be trained in them, I must confess that I feared it might happen that students who should pass through our courses might find that they were armed with a scientific weapon that they had no means of using in industrial warfare.

But all these fears, I am happy to say, have turned out to be groundless. Every intelligent student—and I say it honestly, without boasting, and as a matter even of astonishment to myself—every intelligent student who goes through our complete diploma course secures a berth within a comparatively short time. Indeed, I may say even more than that. It has come about during the last two or three years that students are offered salaried posts before the completion of their College course, and before, therefore, they are able to leave the College to take up the duties which they are engaged to carry out; for example, some of the students who will complete their course with us next month—July—are already engaged for salaried employments. To-day, then, there is certainly as good, nay, even a better, chance for a man to obtain work speedily on completion of his course at the Central Technical College than there was years ago, when there was not a tenth of the number of institutions undertaking to give technical instruction.

So far, then, the condition of the College is entirely satisfactory, but there is one thing, however—not specially connected with this College as distinct from other London colleges—which does rather perturb me, and that is the want of co-ordination of education in our City. The power of giving instruction in London is great, the facilities for obtaining this instruction are increasing day by day, but there is absolutely no generalship, there is an absolute lack of any system of co-ordination. Why should not a student, who had decided to prepare himself for a particular profession, go from day to day, or better, perhaps, from week to week, to different colleges to receive instruction in the different branches of his training from experts who had devoted themselves to the different lines of

thought and investigation? At the present time, every teacher of electrical engineering in London, for example, has, in his teaching, to go more or less through the whole range of the subject, and, therefore, but little advantage is taken of the special tastes and faculties that he possesses to develop along some one special line. The difference between the requirements of a tailor and a watchmaker is understood, that a professor of mathematics should not also be required to profess Latin and Greek is accepted, but little attention has been devoted to securing economical higher technical instruction in London. Each educational body apparently tries to imitate what its neighbour has found successful, instead of co-operating to secure still greater success. Every engineering student must learn many things, but there is no necessity that each student should learn everything at one place; even co-operative stores, where it is proposed to sell everything, have to be supplemented by auxiliary stores because the original project cannot be carried out in its entirety.

It has been objected that the distances between the different London colleges is too great for any effective co-operation, or co-ordination, in teaching to be carried into effect. But the objectors appear to forget that the students of any one London college not unfrequently come daily from Harrow, Lewisham, Wimbledon, &c., so that the homes of the students attending the same lecture are actually farther apart than are the different colleges to which they might go on different days, or during different weeks.

Much has been done during the last few years to improve education in London, but it will not be until there is co-ordination in the higher branches of the teaching that we shall have a system of instruction worthy of the greatest city in the world.

Dr. DUNN (Northern Polytechnic Institute) said he quite agreed, with Mr. Woodward, that it was very desirable indeed that all their plumbers and bricklayers and workmen of every description should have a thorough grounding in the principles of physics and mechanics and chemistry. But, while he considered that a general training in these sciences would be the best for trade students as for others, yet the experience to which Sir Philip Magnus had referred had shown that it was practically an impossibility to get trade students to attend such complete courses as Mr. Woodward suggested. In

fact, after they had begun to work at their trades, they had not the time for it, and if they were to persuade these trade students to acquire even a little of the principles of the sciences underlying their various industries, they were more or less forced to a compromise, and they were driven to the course which Sir Philip Magnus mentioned in his paper. They were driven to devise for them special courses in which the principles of physics, and of mechanics, and of chemistry should be taught to them chiefly by illustrations drawn from their various trade practices. The connection which he wished to point out between the paper of Sir Philip Magnus and that of Mr. Wells was this: That whatever might be the case with regard to the artisan taught in these classes, it would be essential that the teacher should himself have a thorough training in mechanics, physics, and chemistry. There was one paragraph in Mr. Wells's paper in which he had spoken of the attempt which had been made to establish a system of dual control in technical classes, in which the practical part was taken by a workman who was a practical man himself and nothing more, and the theoretical teaching undertaken by a man who, whatever his theoretical qualities might be, was not a workman or a practical man. He had had some experience of that method of teaching, and had invariably found it unsatisfactory. The theorist never commanded the confidence of the artisan because he was not practically conversant with the trade, and, moreover, the two teachers were never able to work in complete sympathy and co-operation, if for no other reason than the simple fact that neither knew exactly what the other was doing. It was essential, therefore, in the present state of things, that there should be one teacher, not two of each technological class, and, inasmuch as only a man who had a fair knowledge of the principles of science could be expected to take from the material at his command precisely that which was requisite or which bore upon the needs of the artisan whom he had to teach, it would be essential that the teachers in our technological schools should undergo some course of continuous and serious training, such as that which had been so admirably sketched by Mr. Wells. If we could by the adoption of some such system as that, look forward to the certainty of having teachers of technological classes equipped in that way, then we could afford to wait for that time. Such a system was an eminently workable one, one that could be put into practice everywhere, and one which, in a very few years, would bring about a revolution in the ordinary qualifications of the technological teacher.

Professor SILVANUS THOMPSON said that the point which Sir Philip Magnus had raised, that it might have been thought that ordinary instruction in mechanics, physics, and chemistry would be the best preliminary instruction for artisans engaged in trade processes, whereas experience had shown it was not so, was a very interesting point to him, inasmuch as

that had also been their experience at Finsbury College to a considerable extent. He was speaking now of evening classes for trade students, and the reason was substantially that which Dr. Dunn had urged—that the students who went to these trade classes could not be induced to go outside what they considered to be the training which was obvious for them—they could not get them to attend classes which were known by these abstract names. A plumbing student, for example, could not be got, as a general rule, to attend classes on geometrical drawing, taught by a drawing-master, and for this simple reason—that the geometrical drawing teachers taught geometrical drawing not of the plumbing, but of scores of different trades, and did not understand one of those trades, or why the plumber wanted to know geometrical drawing at all. The plumber, therefore, had no confidence in him, because the teacher could not teach him that particular kind of geometrical drawing which he wanted. Drawing was an essential in how many different crafts? Practically in every one. The engineering fitter, the carpenter, the plumber, the metal worker, the cabinet maker, all these needed a knowledge of drawing, and yet it would be absolutely useless to put all these men together in one class, under one teacher, because the teacher would not know what to draw. You must have the cabinet maker taught drawing by a man of his own craft, the plumber taught by a plumber, and so on, or else they would not secure the confidence of the students, and they would not believe that their classes were of a thoroughly practical and useful character. The admirable paper which Mr. Sidney Wells had given them upon the training of technical teachers he wished to most heartily endorse. He had made experiments in the same way, and had found that it required a special kind of young workman to train into the future teacher. And, lastly, he wished to strongly and cordially emphasise the weighty words of Professor Ayrton upon the want of co-ordination in their educational institutions, as between the highest and lowest. He only wished there were more co-ordination between the Technical College at Finsbury and the higher Central Technical College in Exhibition-road. But the difficulty of co-ordination in London was mainly geographical. It was almost impossible to send a student from one end of London to the other. He had tried to establish something of the kind, but the geographical difficulties were too great. The library of the Central College was in Exhibition-road, and they could not expect a student from Finsbury, who wished to consult a book in that library, to do so, when it would involve a journey of half-a-day. However, geographical co-ordination was one thing, but co-ordination in instruction was quite another, and that was where real need for reform lay. He could point to two institutions having, practically, on paper, the same programme, but whereas in the one case lads of 13 and 14 years of age were being taught, the other was giving the highest and most specialised

training to young men who had already passed a tough matriculation. Yet, on paper, the programmes were equal. There was an obvious want of co-ordination when two institutions having such widely different aims, and so totally differently equipped, should appear, on paper, to be giving exactly equal instruction.

Mr. A. PARK, J.P. (Ashton-under-Lyne), wished to express his gratitude to Mr. Wells for the excellent paper he had read. Representing one of the largest technical schools in one of the manufacturing towns of the North, they had experienced the difficulty, having a school which was attended by over a thousand students, that Mr. Wells had mentioned, in finding teachers who should give a practical interest to the subject they taught, and yet have a thorough knowledge of it. They were able to secure a class for plumbing, and to get it attended by about 20 students, but it did not succeed, largely because for a teacher they had an intelligent man who had little knowledge at all of the principles of teaching. Another point alluded to by Mr. Wells was of very great moment. How were they to get a practical artisan, if he were busily engaged from six o'clock in the morning to six o'clock at night, in these small provincial towns, where they were anxious to promote the local industries, how were they to get these men so equipped with the faculty of teaching as to make their teaching successful? He hoped that city guilds and other companies, who had shown such interest in the whole subject, would give pecuniary facilities and help in that direction. In Ashton-under-Lyne they rated the borough a 1d. in the £ for the support of technical education, but hitherto they had found a difficulty in regard to the teaching so serious, that they had been almost compelled to restrict their teaching, in that large and otherwise successful school, to the training and education of those that attended it for the purpose of learning the principles of science that underlay their different local industries. He hoped that one result of the Congress would be to stimulate those who were engaged in this work in small provincial towns, where they had a comparatively small constituency to draw upon, and where the opportunities and facilities for providing material in the way of teaching capacity, to carry on the work of technical trade subjects, were almost insuperable.

Dr. W. GARNETT thought they were all agreed that it was essential, if they were to attract artisans to their classes, that the teachers should be thoroughly acquainted with the practical details of the trades to which the artisans belonged; but there were two difficulties, which they encountered at the start, with which they had to contend. Both those difficulties had been already alluded to, but he wished to accentuate them. The first was the long hours during which the artisan had to work in the shops. The first "quarter"—the hours before breakfast—formed the real difficulty in the organisation of tech-

nical instruction, for the man who had to be in the workshop at six o'clock in the morning could scarcely be expected to efficiently devote his evenings to class work; and if he gave up his practical work, he must give it up entirely. He could not generally succeed in getting shorter hours, and the workman who gave up his work entirely was very much like the teacher who, after devoting himself for five or six years to educational organisation, instead of teaching, attempted to solve a difficult differential equation on the blackboard before a class without having seen it beforehand. The second difficulty was the time that was required to produce a good teacher. In the training of a teacher, as in the preparation and manufacture of steel, the "soaking pit" had a very important function to fulfil. Without it, the steel ingot, when the pinch came, was liable to burst, and scatter death and destruction all around, or else it had to be re-heated for each successive operation, involving a great waste of fuel, which, educationally interpreted, meant that the young or imperfectly-trained teacher had to cram up his lesson first before he met his particular class. Those two difficulties meant that a considerable time must elapse before they could secure a class of practically-trained teachers who had also been trained to teach, and in the meantime the best temporary solution at their command was that of dual control. As a rule, the system of dual control would not work, but he believed there were conditions under which it could be made to work fairly satisfactorily as a stop-gap. When he first began to teach technology to plumbers, he used to get the practical teacher to come to his class, and to lecture to him as well as to the other students, and then he used to get the plumber to tell him how far he had made himself intelligible to the class, and to suggest to him the difficulties which the students met with, and how to make his (Professor Garnett's) teaching more applicable to them, so that they had the theoretical teacher, so to speak, and the practical teacher together at the same time. He had felt the same difficulty in dealing with those mechanical trades which depended upon artistic training, and recently, in the case of a class of plasterers in the West of London, when it was wanted to introduce a modelling master amongst the plastering apprentices, and they felt that a modelling master from the school of art would soon find himself out of touch with those young men, they arranged that the practical teacher of plastering should almost always be present at the modelling class, when the modelling master was dealing with the apprentices, so that he might give the necessary practical turn to the instruction of the modelling master, and also that, by his presence, he might inspire that confidence in the young apprentices without which they very soon lost interest in the teaching of any teacher, however well trained that teacher might be.

Mr. C. T. MILLIS (the Borough Polytechnic) thought it was of the highest importance that the

function of the workshop, in regard to trade education, should be fully recognised. The workshop should be used for illustrating the principles which were learned in the class room, and the workshop should be so fully equipped that the students might be taught to become good "all round" workmen. The unfortunate part of technical trade education in the present day was the difficulty of getting the workman to realise that there was something more than a part of a trade to learn. He knew that in ordinary works it was the custom, owing to the almost minute sub-division of labour in some industries, for the workman to feel that only one little branch of their trade entitled them to be recognised as a workman in that particular trade. He had heard in a London Conference the representative of a trade society ask for three teachers to be appointed by the Technical Education Board, in order to provide instruction for what he considered a portion of a particular trade—for one division of the industry itself. That was one of the difficulties they had to deal with, and one that was increasing every day. And so teachers should be chosen with the view of their training the workmen studying under them to become better all-round workmen than they were at the present time. Another point upon which he wished to speak was that alluded to by Sir Philip Magnus in connection with the teaching of elementary science. After very considerable experience of trade students in London, he could confirm what Sir Philip had said, for he had found it a practical impossibility to get the ordinary workman of the rank-and-file to attend the Science and Art Department classes in geometry, mechanics, machine-drawing, and chemistry. He had been accused on many occasions of being an enemy of the Science and Art Department classes in London, but he was not, and they must remember that, although such classes had been attended by artisan students, they had been attended by the very pick of artisan students. It was not his intention or desire to say one word against those classes, but they must remember that there was something absolutely necessary in the teaching of artisan students at the present time, and one important step had been taken by the City and Guilds of London Institute in introducing syllabuses as guides for the preliminary scientific instruction of students attending the trade classes. Much as he agreed with the paper of Mr. Wells on many points, it did not touch, he thought, upon one point which was at the root of the difficulty of getting good trade-class teachers. There were two causes of that difficulty—one the want of the necessary time in order that the teachers might prepare themselves for teaching, and the other was the want of recognition which they received, as well as inadequate remuneration.

Professor CHATTERTON, as one of the earlier students at the Finsbury Technical College and subsequently at the Central Technical College, South Kensington, wished to add his testimony to the

remarks of Professor Ayrton respecting the excellence of the training which the students had received there. He had been through the complete course of instruction for civil and mechanical engineers at both Institutions and so was in a position to speak of the excellence of the methods of imparting instruction to the students. He was happy to say that he was fairly well acquainted with the careers of all his fellow students, and it was a fact, which he could vouch for, that they were all doing very well, though engaged in the most varied branches of technical work. This was, he thought, perhaps the most valuable proof he could offer of the efficiency of the educational work which was now being carried on under the direction of Professor Ayrton and his colleagues.

Professor J. VIRIAMU JONES, F.R.S. (principal, University College, Cardiff), thought there was a danger of their committing themselves to an educational heresy, in the interests, not of the better education of the working man, but in the interests of the attractiveness of the classes. Now, there were two distinct and definite questions. It was a surprise to him, for instance, to hear Professor Silvanus Thompson maintain that all the freehand drawing to be learnt by a plumber should be taught by a plumber, who was a man engaged in the trade, but who, if he was going to teach all the other trades as well, would be a Jack-of-all-trades. With respect to physics, would it not be absurd that plumbers who went to the College at Finsbury to learn physics should have physics taught by a plumber, when they might enjoy the opportunity of hearing lectures upon the very same science from no less an authority than Professor Thompson himself? He hoped they would not commit themselves to the theory that their artisans would not in the course of time find the best instruction, in much of the science bearing upon their trade, the most attractive. He hoped and believed that the good sense of our artisans would make that view prevail. And they must not forget that we were now in a period of transition, and in a period of transition to take what was not the best educational principle as our guiding principle might be expedient if they only knew what they were doing, and if they realised that the highest educational aim was not theirs at the moment. The problem of how to make a man into a good artisan and the problem of how to make an artisan learn were quite different. We in England were endeavouring to solve, through our educational system, the problem of how to make a man a good artisan. Many of the remarks he had listened to in that discussion had seemed to indicate that what was mainly present was the mere temporary problem of how they were to persuade artisans—a great many of whom had not had the advantage of a preliminary training in the elementary educational schools—to go to classes as an adult artisan in order to learn the science bearing upon his trade. He did hope that they would not, in this period of transition, commit themselves to the idea that the artisans of England

were not going to take advantage, in respect to the science bearing upon their trades, of the very best teaching that could be supplied to them. He was convinced that it would not be long before they felt that to be taught by a specialist in mechanics, physics, chemistry, or drawing, was a far better thing for them than that they should be taught by one of themselves who might have learned a little of those subjects. He wished to conclude by giving a high testimony to the work of the students at the Central College, for he had seen them at work, and the energy with which they threw themselves into their studies and investigations bore out all that Professor Ayrton had said of them.

Mr. J. H. REYNOLDS (director, Municipal Technical School, Manchester) said there was a note in the remarks of Professor Ayrton which deserved a wider application than he had given to it—that of co-ordination. Was it not time that the Science and Art Department and the City and Guilds of London Institute took into consideration the question of co-ordination? The want of co-ordination between those two departments, who, by their programmes, were doing so much to control and direct the whole policy of technical education in this country, was painfully evident to anyone concerned in the subject. Classes were established in connection with the Science and Art Department, and also in connection with those of the City and Guilds of London Institute, and those classes were continually overlapping each other to the serious detriment of the work in which they were engaged, and to the serious waste of time of the students. He thought the time had arrived when those important institutions should consider whether it was not possible to arrange a programme of instruction which would do away with the present wasteful overlapping. The Technical Instruction Act said that it was not legal to teach a trade in a school. That was a portion of the Act which remained a dead letter in most localities, but it was on the plane of a good deal of the armchair legislation from which the country suffered in reference to education, as it was arranged not with reference to the needs of the subject, but on the lines of the bureaucratic experience of those who knew very little of what was demanded by the interests of technical education in this country. He thought the time had come when large centres of industry should be permitted to arrange their own schemes of technical instruction. They knew what they wanted much better than any council or body sitting in London, which must necessarily be out of touch with the actual requirements and interests of those districts. As to teaching, his experience had been that some of their most valuable teachers had been men who had had hardly any college training whatever, but they had the practical knowledge, and the zeal, and the power of imparting knowledge, which were essential to the true technical teacher. The plumber had been very much in evidence during their discussion that morning, but it was of no use to put him under a

teacher, however well trained in science, who had not a practical knowledge of the craft. He should be under the direction of one responsible teacher, who knew the application of science and art to the trade of the plumber, and could therefore give to an artisan an intelligent knowledge of the principles of the science which underlay his business. The workman would take that knowledge gladly from the man in whom he had confidence, as a man who really understood the art and practice of the plumber. And what applied to the plumber applied equally to the carpenter, to the engineer, and to the textile student. In Manchester they found that if they wanted a carpenter to take up the subject of geometry they must perforce put him in the hands of a man who understood the application of geometry to the art of the carpenter and the joiner. He would not take his instruction from the engineering instructor. And so on with the textile trade. If they wished for the attendance of those who desired to understand textile weaving, and the mechanism by which it was accomplished, they must get the instructions given by a man who had devoted himself to the mechanism of weaving, and who, if he dealt with the subject of applied mechanics, would take his illustrations from the intricate machinery in connection with which the student was engaged. Only in that way could they get the student interested in the practice of his own craft. That did not necessarily imply that the head instructor in weaving or in like subjects was a man who would do all the teaching in all branches of the subject, but if they wanted to have the work thoroughly well done they must put it in the hands of one who had a general knowledge of the whole of the matters to be dealt with, and he must be helped by men who had devoted themselves to mechanics or other sciences connected with weaving, or whatever the subject might be. But they could not do that, and work with the Science and Art Department and the City and Guilds of London Institute too, and the time had come when the grants given by the Science and Art Department should not, as now, be given for separate subjects, but placed in the hands of responsible bodies, such as the municipalities, who would work in the best interests of education. The gentlemen who composed these bodies might be trusted to do their work well—they dared not do it ill—and thus, instead of diffusing their efforts over a variety of science subjects, in order to earn the grants of the Science and Art Department, they would restrict their teaching to those subjects which were of most importance to the industries of their district. But the root of the difficulty of successful technical instruction was not whether they were to teach science to the artisan so much as of preparing him in the elementary schools of this country, by means of a sound general training, continued until 14 years of age at least, to take the subsequent instruction necessary to the artisan, no matter in what industry he might be engaged. The student who came to

the technical school at 14 years of age ought to know enough of physics, elementary chemistry, and geometry to take the special instruction they were prepared to give him. They were wasting most valuable time throughout the various technical schools of this country in giving the most elementary instruction in ordinary school subjects, instead of training the artisan. Take plumbers, for example. There were scores of men who could not make the simplest calculation in arithmetic, and when they came to the examination of the City and Guilds of London Institute they would find instance after instance where the student had not answered a single question. It was not because the plumber, in many instances, did not know his subject, but simply because he had not the faculty of writing down in an intelligent way that which he really and truly knew. They had had the same experience in Manchester in regard to instruction for shoeing smiths. The examinations in connection with it had been of the greatest possible good to a class of men who had hitherto not come within the purview of technical instruction, but they dared not ask these men to answer by means of a written paper. They would be utterly incapable of doing it, and consequently nothing but a *viva voce* examination could test the knowledge which these men really possessed. The whole system of our methods and means of technical instruction needed revision, and should be placed in the hands of the responsible bodies in the various districts, to whom is entrusted the spending of the public money, and who had the power and the resources needful for the effective organisation of technical instruction. If that were done, they would make strides in imparting technical instruction of which they now little dreamed, but so long as they had regulations such as those which appeared in the late Departmental Report on the Distribution of Science and Art Grants he utterly failed to see how they could compass what they had in view—the imparting of a sound technical knowledge to the people throughout the length and breadth of this country.

The Right Hon. A. J. MUNDELLA, M.P., said he felt impelled to say a word or two to accentuate what had fallen from Mr. Reynolds. He had demanded, very rightly, that there should be less overlapping, but what a deplorable picture he had given them! The overlapping was really this—that the science and art teacher was required to be an elementary teacher in order to furnish the working men with the necessary knowledge to enable him to take advantage of the teaching which he came to receive. The whole of the root of the mischief or which he complained was what was very common in Lancashire—the half-time system, and the low standard of our elementary education. The first thing to be done, before they could expect intelligent working men to receive instruction bearing upon their industry, was that they should be properly

taught, and the ground prepared, in the elementary school, and that the science teacher should not have to take the place of the elementary teacher, and bring about that overlapping of the elementary teacher's work, which was much more common than the overlapping by the elementary teacher taking the work of the secondary teacher. Our standard was altogether too low. Mr. Reynolds spoke of a number of plumbers coming into the Manchester school who had never held a drawing pencil in their hands. Those men ought to have been prepared in the elementary school, and drawing ought to be taught in every elementary school. The moral which he wished to draw from that was to urge upon Parliament the necessity of raising the attendance at schools to the same length of period and to the same age as that which prevailed in other countries, where technical education was carried on to a greater degree. Until they did that they were calling upon the technical teacher to make bricks without straw. Herr von Diefenbach would tell them that 14 was the age to which they remained in the elementary schools in Würtemberg. In Switzerland it was raised to 16 years, and we in England still clung to our miserable half-time system. What could we expect from a system in which children began half-time at eleven and left school at thirteen? He had been in the rural districts lately, and found that the fourth was the prevailing standard. We had science and art schools and polytechnics abounding all over the country, but those who attended them were quite unprepared to take advantage of the instruction given. They must first raise the age of elementary education, and then he was sure that Sir John Donnelly would be very glad indeed, with the rest of the Science and Art Department, to vest more power and money in local hands, and to place higher education under local control. And then they would be able to prevent overlapping. But don't let them part with the little higher education which they had to give to the masses of the country until such time as they had raised the whole standard of elementary education in the country, and prepared the masses to take advantage of those institutions which they were now, for the first time, bringing to their door.

The CHAIRMAN, in bringing the discussion to a close, thought he should say a word or two, otherwise it might be considered that they had not really appreciated the value of the papers which had been read to them. It was impossible from the first to have anticipated the difficulties that technical education would meet with, and they were now striving to solve those difficulties. Sir Philip Magnus had referred to those words of the Technical Instruction Act which forbade the teaching of the practice of any trade or profession. But the Act would never have been passed had those words not been included in the definition, and he thought all the difficulty was really met when they laid emphasis on the word "practice." That is to say, they might teach how a

thing was to be done, but they must not carry the teaching so far as to give that rapidity and dexterity of manipulative skill which was required for the craftsman or journeyman, and if they regarded the words of the Act in that way they would find that there was really not much difficulty in working the Act satisfactorily, and, as a matter of fact, he did not think that difficulty had been discovered. There was one point with regard to the teaching of students upon which Professor Jones had admirably touched. They were rather apt not to sufficiently distinguish between what the students wanted and what was good for the students. It might be necessary possibly at first to have a technical teacher to try to teach drawing, as, for instance, a cabinet-maker to teach cabinet-makers, but he was glad to say he was not taught drawing by an engineer. Professor Ayerton's remarks on co-ordination rather dwelt upon the circulation of the students than the co-ordination of the different institutions in London, but the difficulty raised by the size and population of London should be taken into account. He hoped he might tender, on behalf of the Congress, their thanks for the papers which had been read to them.

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### WEDNESDAY AFTERNOON, 16TH JUNE.

#### SECTION A.

The Right Hon. A. J. MUNDELLA, M.P., in the chair.

The CHAIRMAN, in introducing Herr von Diefenbach, of Stuttgart, said that those of them who had read the report of the recent Committee, published by the Irish Members of the House of Commons some time last Session, would have read with the greatest interest the report of their Commissioner, who had visited Würtemberg. Forty years ago it was a poor country, almost wholly agricultural, and there was great lack of employment, especially in the winter. Since then the Kingdom of Würtemberg set up a Commission to give industrial instruction to the people. Herr von Diefenbach was a member of that Commission, and so had a practical acquaintance with the whole question. The report given by the Commissioner of the Irish Committee was to the effect that he found no part of the Continent of Europe more prosperous than Würtemberg, and that he left the country with the assurance and the highest confidence that there was not a pauper in the Kingdom. They might, therefore, look forward with interest to Herr von Diefenbach's paper.

### TECHNISCHE ERZIEHUNG IN WÜRTEMBERG.

VON J. V. DIEFENBACH.

Würtemberg im Süden von Deutschland hat nur zwei Millionen Einwohner und 19500 sq. kilo-



meter Land; es ist vom Neckar und der Donau durchflossen, an der Ostseite des Schwarzwaldes gelegen zwischen Baden und Bayern, im Süden vom Bodensee begrenzt. Das Land ist von verschiedenen Gebirgen durchzogen, grossentheils fruchtbar; die Bevölkerung lebte bis in die 40 Jahre von Ackerbau, Viehzucht und Weinbau; ein wohl entwickeltes Kleingewerbe sorgte für die Verarbeitung der heimischen Rohproducte und das Land bildete ein nahezu für sich abgeschlossenes Wirthschaftsgebiet; bloss handgewobene Leinen- und Wollstoffe und Leder fanden ihren Weg nach den benachbarten Baden, Bayern und der Schweiz.

Von mineralischen Schätzen birgt das Land reiche Eisenerze, grosse Steinsalzlager und Kalksteinberge, deren Verwendbarkeit zur Herstellung von vorzüglichem Portlandcement erst in den letzten 20 Jahren erkannt worden ist.

Steinkohlen fehlen ganz, reiche Wälder und Wasser-Kräfte sind vorhanden; der Neckar ist die einzige Wasserstrasse für Schifffahrt.

Die Bevölkerung ist arbeitsam und intelligent,  $\frac{1}{3}$  Katholisch und  $\frac{2}{3}$  Protestantisch; sie hat sich so vermehrt, dass schon seit Anfang des Jahrhunderts eine grosse Auswanderung nach den Vereinigten-Staaten von America eingetreten ist und dass es noch jetzt wenige Familien im Lande gibt, die nicht Verwandte in America, meist in Pensylvanien, haben. Seit Jahrhunderten besass das Land eine Verfassung, die an die Seite der Regierung zwei Kammern setzte; es besass unter einem weisen Fürstenhause eine väterliche Regierung, die vielleicht in dem Volke zu sehr das Bewusstsein erweckt hat, dass die Regierung für Alle zu sorgen und für alle Eventualitäten einzutreten habe, ganz im Gegensatze zu den Anschauungen des britischen Volkes mit dem ausgesprochenen Gefühle der Selbstverantwortlichkeit und Selbstregierung.

Zunächst einige *historische Mittheilungen* über die *Entwicklung des Schulwesens* in Württemberg. Die Regierung gründete die *Universität Tübingen* im Jahre, 1477, gleich mit 4 Facultäten einer theologischen, juristischen, medicinischen und philosophischen oder artisten facultät. *Eigentliche Volksschulen* gab es im 15-ten Jahrhundert im Lande noch nicht, wohl aber zahlreiche *Lateinschulen* die meist aus den *Klöstern* hervorgingen; im Jahre 1387, hatte man schon in Stuttgart, der Hauptstadt, einen öffentlichen Schulmeister.

*Herzog Christof v. Württemberg* gab als erster deutscher Fürst im Jahre 1559 dem Lande eine neue *Kirchenordnung*, in der der Begriff der *Volksschule* klar erfasst war und der die *Latein- und Particularschulen* eingehend

ordnete; es entstanden 12 *Klosterschulen*, die zum Besuche der Universität vorbereiten und von denen heute noch 4 bestehen, an die sich das bekannte theolog. *Stift* in Tübingen anschliesst.

Einen weiteren gewaltigen Impuls gab dem Unterrichtswesen des Landes die im Jahre 1781 von *Herzog Karl* errichtete *Karlsschule*, nach dem Ausspruche des Universitäts Kanzlers Rümelin, "*der erste Strahl des neuen in Europa aufgegangenen Lichtes*"—Sie war die *Zweite Universität* des kleinen Landes, gieng aber mit dem Tode des Fürsten nach 14 jaehrigem Bestehen wieder ein. Die berühmtesten Karlsschüler waren der Dichter *Schiller* und der Geologe *Cuvier* und Andere. Kaum eine der vielen Anregungen, welche die Karlsschule gegeben, ist verloren gegangen und fast eine jede in ihrem Kreise der Kern und Mittelpunkt für *neue Schöpfungen* geworden.

Aus dem *Gymnasium* in Stuttgart, das nur die *alten Sprachen* pflegte hatte sich im Jahre 1796 eine *realistische Abtheilung* herausgebildet und aus dieser entstand im Jahre 1818 die *erste Realschule* des Landes; es bestehen jetzt 14 grössere, und 66 kleinere, im Ganzen 80 *Realschulen* im Lande.

Aus der Stuttgarter Realschule entwickelte sich im Jahre 1832 die *Gewerbeschule*, als eine für sich bestehende Anstalt; sie wurde im Jahre 1840 zur *Polytechnischen Schule* umgewandelt. Von ihr zweigte sich im Jahre 1845 zur Ausbildung von Bauhandwerkern und niederen Architekten die *Kgl. Baugewerkeschule* ab.

Seit 1853 kamen dazu die *Gewerblichen Fortbildungsschulen*; mehr machte sich auch die Fürsorge für die Fortbildung des *weiblichen Geschlechtes* geltend; man errichtete *weibliche Fortbildungsschulen* und *Frauenarbeitsschulen*. Damit ist in Kürze die Entwicklung des Schulwesens dargelegt; und es soll nun einiges Organisatorisches und Statistisches folgen.

*Die technische Hochschule in Stuttgart* gliedert sich in 6 Fachschulen, für Architektur, Bauingenieurwesen, Maschinenbau, chemische Technik, Mathematik und Naturwissenschaften und für allgemein bildende Fächer. Seit ein Paar Jahren ist der Anstalt eine *besondere Abtheilung* für *Electrotechnik*, der *ersten in Deutschland* mit umfassendem Laboratorium zugelegt worden. Zahl der Hauptlehrer 21, Hilfslehrer 25, Schülerzahl c. 650.  $\frac{2}{3}$  von Württbg.  $\frac{1}{3}$  Ausländer. Aufnahme-alter in der Regel 18 Jahre. Studienzeit 3—4 Jahre. Jahresaufwand, 330000 Mk. eigene Einnahmen 58000 Mk., so dass ein Jahres Zuschuss der Regierung von 270000 Mark erforderlich ist.

Die *Kunstgewerbeschule* in *Stuttgart* soll für die verschiedenen Zweige der *Kunstindustrie* solche Kräfte heranbilden, die in ihrem Fache einen höheren Grad kuenstlerischer Ausbildung erstreben und besonders auch der Ausbildung der *gewerblichen Zeichenlehrer* dienen; sie hat Ateliers für Architekten, Bildhauer, Modelleure, Ciseleure, Decorationsmaler.

10 Hauptlehrer. Schüler Zahl *Winter* 120—130; *Sommer* 70—80. Jährlicher Staatsaufwand 50,000 Mk.

Die *Baugewerkeschule* zerfällt in eine Vorclasse, 2 mathematisch naturwissenschaftliche. Classen und 3 *Fachschulen* und zwar:—

(a) für Bauhandwerker—niedere -hoch- und Wasserbautechniker.

(b) für Geometer und Kulturtechniker.

(c) für Maschinentechniker und Electrotechniker.

Die Anstalt zaehlte im Jahre 94/95.

im Winter 20 Abtheilungen.

„ *Somer* 10 „

mit 23 Hauptlehrern und 13 Hilfslehrern.

Schülerzahl, *Winter* c. 720.

„ *Somer* c. 470.

Jährlicher Staatszuschuss 125,000 Mk.

Unter den Schülern sind in der Regel 25 % Ausländer.

Für diejenigen, welche die 2 letzt genannten Aulstalten kennen lernen wollen, sei bemerkt, dass daselbst je eine *permanente Ausstellung* von *Schülerarbeiten* aus *früheren Jahren* vorhanden, die rasch ein Bild über die Leistungen und Fortschritte dieser Schulen geben.

Mitte der 50 Jahre mit der Entwicklung der *modernen Gewerbe* im Lande veranlasste mein langjähriger früherer Chef, Dr. von Steinbeis, die Gruendung der *gewerblichen Fortbildungsschulen*.

Sie sollen der gewerblichen Jugend beiderlei Geschlechts über 14 Jahre in einem freiwillig und unter Bezahlung eines Schulgeldes besuchten Unterricht, die zu einer rationellen Ausübung der practischen Thätigkeit in Gewerbe, Handel und Haushalt nöthigen theoretischen, beziehungsweise artistische Ausbildung ermöglichen.

Im Jahre 1894-95 bestanden gewerbl. Fort-

bildungsschulen in 223 WürttembergOrten, mit einer Einwohnerzahl von c. 867000 Seelen—28 dieser Schulen haben Sonntags, Abends und auch Tages zeichenunterricht; 100 nur Sonntags und Abendunterricht. Lehrerzahl in allen Anstalten zusammen 1146; Schülerzahl circa 24000, darunter 6000 weibliche, welche grösstentheils die Frauenarbeitschulen besuchen.

Die besuchtesten Unterrichtsfächer sind zur Zeit. Freihand zeichnen mit 14300 Schülern.

Rechnen	„	15000
Deutsche Sprache	„	9700
techn. Zeichnen	„	7000
geometr.	„	5000
Buchführung	„	3600

Die besuchtesten Fortbildungsschulen des Landes sind:

Stuttgart: 149 Lehrer, 2000 Schüler und Schülerinnen.

Heilbronn	40	„	700	„	„
Esslingen	38	„	700	„	„
Ulm	38	„	680	„	„

Die Gemeinden haben die *Schullocale* zu stellen, welche vielfach auch noch gleichzeitig von anderen Schulanstalten bernützt werden.

Die *Kosten der Lehrergehälter* werden vom *Staate und den Gemeinden, je zur Hälfte*, bestritten.

Der *Gesamtstaatsaufwand* für diese Schulen, welche von Inspektoren des Staates regelmässig inspiciert werden, beträgt jährlich 204000 Mark.

Für unsere *Arbeiterclassen* bildet die *gewerbliche Fortbildungsschule* deshalb eine so wichtige Bildungsgelegenheit, weil sie auch dem jungen Manne ganz unbemittelter Familien Gelegenheit bietet, während seiner Lehrjahre d. h. vom 15ten Jahre an, wo er schon einen Theil seines Lebensunterhaltes verdient, sich weitere für sein Fortkommen und Aufsteigen werthvolle Kenntnisse und Fertigkeiten anzueignen—Eine der Schwierigkeiten für den Besuch dieser Anstalten bestand früher in der landesübigen *langen Arbeitszeit*—11-12 Stunden per Tag; die Arbeitszeit ist aber nun auch in Deutschland viel kürzer geworden und das kommt dem Besuche der Schule sehr zu gut.

Unsere *Fortbildungsschulen* sind keineswegs nach einer Schablone eingerichtet; sie richten sich nach örtlichen Verhältnissen und Bedürfnissen; Z. B. sind an Orten wo *Kunstgewerbebetriebe*:—Stuttgart, Heilbronn und Gmünd—besonders befähigte Lehrer und

N.B.—Zu eingehender Information: “über die gewerbliche Erziehung in Württemberg von Carl Genauck, Ingenieur und Professor. Verlag: A. Schöpper in Reichenberg, Mähren—ferner:

Statistik des Unterrichts und Erziehungswesens im Königreich Württemberg. Veroeffentlicht im Ministerium des Kirchen und Schulwesens erscheint alljährlich, Verlag W. Köhlhauer, Stuttgart.

Classen für artistisches Zeichnen, Modelliren, Ciseliren, und Graviren angestellt; an anderen Orten, wo zahlreiche *mechanische* Werkstätten und Maschinenbauanstalten vorhanden wird dem Maschinenzeichnen besondere Aufmerksamkeit geschenkt; an anderen Orten wird das Bau- und Möbelzeichnen besonders gepflegt.

Von grösster Wichtigkeit ist die Gewinnung tüchtiger *praktischer Lehrer* für diese Anstalten; man sucht wo möglich solche Kräfte zu gewinnen welche als Werkmeister in einem Gewerbe noch thätig oder thätig gewesen sind. In grösseren Städten ist das weniger schwierig als an kleineren Orten. Die Regierung ist seit vielen Jahren bemüht Gewerbetreibende, welche besondere Befähigung zeigen, zu *tüchtigen Lehrern* für Fortbildungsschulen dadurch auszubilden, dass sie solchen Unterstützungen zum Besuche höherer technischer Lehranstalten verleiht.

Von besonderem Erfolge war die hausgewerbliche Ausbildung von *Schülerinnen* durch Gründung der *Frauenarbeiterschule in Reutlingen*, die sich aus den kleinsten Anfängen heraus entwickelt hat; diese Anstalt ist alljährlich von cir. 400 Mädchen besucht; sie unterrichtet dieselben in allen *weiblichen Handarbeiten* und bildet nun hauptsächlich *Arbeitslehrerinnen* aus, die Anstellungen in den fernsten Ländern gefunden, und zur Gründung zahlreicher ähnlicher Anstalten im Auslande geführt haben.

Um den gewerblichen Fortbildungsschulen für beide Geschlechter stets eine praktische Richtung zu sichern ist deren Leitung ausser dem Schulvorstande einem localen *Gewerbebschurathe* unterstellt, bei dessen Wahl man die Herbeiziehung hervorragender Gewerbetreibender stets im Auge hat.

Unsere Fortbildungsschulen sind noch weiterer Ausbildung fähig; wir sind darin aber noch nicht so weitgegangen wie unsere Nachbarn in der Schweiz und in Oestreich wo eigentliche *Lehrwerkstätten* für verschiedene Gewerbe, wie Schreinerei, Metallarbeiten, Uhrenfabrication errichtet worden sind, die die eigentliche *Gewerbelehre* zu ersetzen suchen. Es ist aber auch in dieser Richtung bei uns eine Bewegung in Gange; bis jetzt sind nur 2 *Spezial schulen für Weberei, Strickerei, Färberei und Appretur* im Lande eingerichtet; da werden nur solche Schüler aufgenommen, welche schon praktische Weber sind, oder Leute die solche Geschäfte betreiben wollen, bei denen die Kenntniss der Webertechnik von besonderem Werthe ist—; bei

unseren Webschulen wurden die Gebäude von den Städten erstellt, während der *Betrieb* in den *Händen einer Cooperativ - association* ruht, der die Industriellen der Gegend angehören.

Die *Verbindlichkeit zum Besuche der Volksschule* erstreckt sich in Württemberg auf die Kinder aller Staatsangehörigen, soweit dieselben nicht eine höhere Schule besuchen oder Privat unterrichtet erhalten. Die *Schulpflichtigkeit* beginnt bei jedem Kinde im 7ten und endigt im 14ten Lebensjahre. Nach Verlassen der Volksschule besteht für alle die Verpflichtung zum Besuche einer *Sonntags- oder Abend schule* bis zum 18. Lebensjahre.

Die Verbindlichkeit für *Errichtung und Unterhaltung der Volksschulen* liegt auf den Gemeinden.

Die Schulzeit beträgt 26 Wochenstunden; davon entfällt 1/3 auf Religionsunterricht

3/7 auf die Sprache

2/7 auf Rechnen und Raumlehre

2/7 auf Realien und Singen.

Auf einen Lehrer rechnet man 90 Kinder—; die Ausbildung der Lehrer erfolgt in 4 evangelischen und 2 katholischen Schullehrerseminarien.

Die *Fertigkeit des Lesens und Schreibens* bilden die unerlässlichste Voraussetzung aller höheren Bildung; die gesetzliche Schulpflichtigkeit aller Kinder besteht heute in allen deutschen Ländern, in Württemberg schon seit mehr als 3 *Jahrhunderten*—In Württemberg kann Jedermann mindestens *lesen und schreiben*—*Rechnen* wird allgemein gepflegt, fast in jeder Schule finden sich tüchtige Kopfrechner.

*Zeichnen* ist ein fast allgemein geübtes Fach, ganz geeignet zur Pflege des Formen- und Schönheits sinnes—welcher sich in den schönen Arbeiten der Frauenarbeiterschulen zeigt. Von den Lehrern der Volksschule wird übereinstimmend bemerkt, dass in den Volksschulen mit den *Mädchen ein höheres Lehrziel* erreicht wird, als mit den *Knaben*.

Eine nicht unwichtige *Eigenthümlichkeit der Württembergischen Culturzustände* ist darin zu finden, dass eine verhältnissmässig beträchtliche Zahl der schulpflichtigen Knaben ihre Bildung in höheren Anstalten als den Volksschulen sucht. Unter 150000 Knaben im Alter von 8—14 Jahren besuchten 13500 d. h. 9% Latein- oder Realschulen, der 11te Theil der männlichen Bevölkerung erlernt somit eine *fremde Sprache*; in der Stadt Stuttgart

besuchen 65% der schulpflichtigen Knaben höhere Anstalten, nur 35% die gewöhnliche Volksschule; fast  $\frac{2}{3}$  der männlichen Bevölkerung erlernen hier alte und neue Sprachen; von etwa 5000 14 jährigen Knaben, die alljährlich als *Lehrlinge* in ein Gewerbe eintreten, kommen mehr als 1500, d. heisst 30% aus Latein- und Realschulen und 3500, d. heisst 70% aus Volksschulen.

Es beweist diess, dass in Württemberg die Keime und Ansätze einer höheren Bildung in Kreise getragen werden, die anderwärts ganz davon ausgeschlossen werden.

Nimmt man dazu die billigen Schulgelder und andere Staatsbenefizien, und Stipendien so kann man sagen dass in *Württemberg seltener als irgendwo anders ein Talent durch Mangel an Pflege verkümmert*.

Man hört jetzt oft im Lande die Klage *ueber zu viele höher gebildete Techniker* während ein Mangel an tüchtigen praktischen Arbeitern vorhanden sein soll, denen man die Stelle eines Vorarbeiters, Werkführers, uebertragen kann. Eine Hauptursache dieser Erscheinung liegt in der seit 1867 auch in Württemberg eingeführten *allgemeinen Wehrpflicht*; dabei wird demjenigen der das sogenannte Einjährigen Examen macht, meist im Alter von 16-17 Jahren, das Beneficium der *einjährigen Dienstpflicht* eingeräumt. Alle jungen Leute der Mittelclassen und mehr auch die der unteren Volksclassen suchen nun dieses Examen zu machen, um nur *ein Jahr lang Soldat* sein zu müssen, während dessen sie sich selbst zu unterhalten haben; viele davon mögen später nicht mehr *praktische Arbeiter* werden, ziehen vor ein Amt zu bekleiden und wäre es auch nur ein solches mit dem bescheidensten sicheren Einkommen.

Unsere *Regierung* braucht bei ihren vielen Staatsbetrieben:—Eisenbahnen, Strassen, Telegraphen stehen ganz unter Staatsverwaltung—einen *grossen Stab von technischen Beamten*, die erst mit 24—25 Jahren ihre Studien beendigen und Anstellung finden, also in vorgerückten Jahren—; auch in der *Privatindustrie* ist es seit Jahren allgemeine Sitte geworden, die Söhne eine höhere technische Ausbildung erlangen zu lassen.

Bei unseren *technischen Hochschulen*—wenigstens soweit sie Maschinenbau und Electrotechnik besonders pflegen—hat sich das Bedürfniss herausgestellt, dem Unterrichte mehr und mehr eine praktische Richtung zu geben. Mehrere der deutschen technischen Hochschulen, so auch die in Stuttgart, werden deshalb in allernächster Zeit mit *umfassenden Maschinenbau-laborationen* zur Vornahme von

Versuchen in grösserem Maasstabe ausgestattet ähnlich wie solche Einrichtungen schon an manchen *Amerikanischen* Anstalten bestehen.

Sir PHILIP MAGNUS thought it would be the general feeling of all present that they were much indebted to Herr von Diefenbach for having written his paper, and explained it so well in our own language. He had had the pleasure of knowing him for some time, and could speak personally of his own indebtedness to him for having given all the information with regard to German schools which he went to Württemberg to acquire. Those who had read the paper would recognise what a really interesting report he had placed before them, and what a deep insight it gave them into the working of the Württemberg system. He was induced to make a remark upon it, because it touched upon many questions which they were discussing that morning. One point was of very great importance. When a comparison was made between the progress of trade in this country and Germany, it was very common to say that the sole reason why the Germans were succeeding so well industrially was because the hours of labour here were shorter than in Germany. But they would see from Herr von Diefenbach's paper that whilst the hours of labour in Germany used to be very much longer, perhaps, than they were in this country, the hours of labour there were now very much shortened, and that this had produced a very good effect upon the attendance in evening classes. And he thought they would also recognise the value of the remarks made in the succeeding paragraph, that all the schools throughout even so small a place as Württemberg were not organised in the same model, but that the instruction was differently arranged so as to meet the requirements of particular districts. That was a distinguishing feature of their system. They had been discussing that morning the vexed question of the best kind of teachers, and they would see that in Württemberg an effort was made to obtain, for all trade classes, educated workmen as teachers, and that they recognised the importance of placing trade-teaching in the hands of persons who were familiar with the practical working of their own trades and able to scientifically explain the principles which govern the practice. They would also appreciate the endeavour to introduce as far as possible trade workshops into the schools, and although they were not so forward in Württemberg as in Switzerland or Austria, where they had the celebrated *Fachschulen*, they were, nevertheless, moving in the same direction. The obligatory age in Württemberg was 14—a child must have completed his 14th year before leaving school. But then, there was something more important than that, for in Württemberg a child was not allowed, after having left school, to waste his time until any age he pleased and then at 18 to go to a technical school, having forgotten

nearly everything he had learned in the elementary school, but attendance at the evening and Sunday schools was, under certain circumstances, obligatory, and to this fact was due in a great measure the intelligence of the German workman and his ability to take advantage of the technical instruction provided for him.

Mr. WM. WOODALL, M.P., said he rejoiced that they had had the opportunity of hearing Herr von Diefenbach, for he had given them much information upon which they might well ponder. He had told them how the experiment of educating the people of a State having a comparatively small population—a population less than that of Switzerland, but small indeed when compared with the population of our metropolis—had been practically limited within the last 50 years, and the expenditure upon that work had been so fully justified by the material profit which the State had realised, that public opinion sustained the Government and the Communes in that encouraging expenditure. But he was a little disappointed in one particular—and he noticed it in the course of previous discussions—and that was that whilst that Congress was specially invited to consider the very higher developments of technical instruction, they had been occupying their time—very profitably, he admitted—in going over the old and familiar ground of the education of the workman. Herr von Diefenbach might have told them how very large and generous was the expenditure in the very highest instruction and training of the captains of industry in Würtemberg. There was nothing that impressed the visitor so much in that pleasant little capital of the State as the schools for electricity, for example, or the the Agricultural School, to which Herr von Diefenbach had referred, and the instruction that was there provided for men to take the very highest rank in electrical and mechanical pursuits. And let it be borne in mind that Würtemberg was one of the many States which composed the German Empire, and although Würtemberg might take proper pride in the manner in which it had developed that kind of instruction, it had competitors with an almost similar story to tell. But we, at any rate, might hope to follow the example which had been so profitably set by Würtemberg in the development of higher education, and we might hope, some day or other, to bring order and co-ordination out of the chaos which now prevailed in our secondary school systems—though he confessed to have been a little disappointed that there was not any indication of any immediate intention in that direction given in the address with which their proceedings were opened on the previous day by the Duke of Devonshire. But, surely, such facts as they had heard deserve to be repeated again and again—that whilst, as Sir Philip Magnus had said, the school age throughout the German empire was practically that of 14, the system of secondary and continuous education occupied the young men and women to an age long in advance of that—and those

who felt, as he did, the humiliation of our sparse acquaintance with languages other than our own, must have been struck with the fact that whilst two-thirds of the children in attendance at the elementary schools were kept in attendance afterwards at continuation and secondary schools, two-thirds of those children, again, were taught a second language other than their own. They heard a great deal about the advantage which continental countries derived from having their young men in obligatory military service, but it was very impressive to find how much pains so large a proportion of those young men took to avoid it, or, at any rate, to reduce the duration of that obligatory service to one year, and that undoubtedly had been utilised very profitably indeed by offering an inducement to a large proportion of the children of even the poorest to pass examinations which gave them relief from all except one year's service. Here he might be disposed to give them some figures on the expenditure upon higher technical schools in Stuttgart and elsewhere, except that they were given so fully and carefully in the report which his colleagues agreed upon and which was presented to Parliament by the Duke of Devonshire last autumn, and which, as it had not been referred to before, he referred to very confidently then. But it was impossible, visiting as they did the remarkable exhibition at Stuttgart, especially devoted to examples of the application of electricity to manufactures and the useful arts, not to be overwhelmed with the evidence of the profitable results that had accrued from the large and generous expenditure on education, from the elementary to the highest. Sir Henry Roscoe had referred to one of the great chemical factories which he had visited in Germany, where a number of highly-paid chemists were employed, the like of which found no parallel in England. But here the fact was brought home to us, that, whilst it was to Englishmen that we were indebted for the discovery of coal-tar colours, at the present time these coal-tars were sent from London to Germany and elsewhere to be converted into the beautiful dyes which we had to purchase back from them, and what had been done in so many departments in the application of chemistry to profitable manufactures was now being pursued with remarkable success in regard to the application of electricity. It was surely abundantly clear to them that it was only by the provision of the very highest facilities in technical and scientific instruction that we in England might hope to rival—he was afraid that he could not conceive it possible that we could excel—the remarkable success that had attended such enterprises in Germany.

A question was asked by a delegate as to whether employers of labour in Germany gave facilities for their workmen to attend classes. In England, for instance, great difficulty was experienced in getting a builder to send his masons to a school for carving.

Herr von DIEFENBACH said that 40 or 50 years ago the same conditions prevailed in Germany, but now it was quite a matter of course that a master sent all his

apprentices to school, and the parents took care that the liberty of their sons to attend was stipulated for in the indentures.

The CHAIRMAN pointed out that in a machine department in Saxony, which employed more than 3,000 workmen, all the youths who entered there had hours allotted to them during which they could attend a technical college to complete their education.

In answer to a further question from a delegate,

Herr von DIEFENBACH said that they did not teach a trade in the Württemberg schools, they expected the practice of the trade to be taught in the workshop, and the school was only to give a man theoretical knowledge.

Prof. SILVANUS THOMPSON enquired as to the average pay of the teachers in evening continuation schools.

Herr von DIEFENBACH replied that they were generally paid per hour—about 3s. an hour for evening classes and sometimes more. There were very few teachers who were employed all their time.

The CHAIRMAN said it might also be interesting to know what the pupils pay.

Herr von DIEFENBACH replied—The fees are very small—about 10s. for six months, for attendance every day, including Sunday.

Mr. SNAPE (Liverpool) said that the difficulty of dealing with the question of half-timers, to which the Chairman had referred, had been brought home to him, as it had been brought home, he thought, to every Parliamentary candidate in Lancashire. One person had said to him, "I like you, and I hope you will win, but if you are going to raise the age for half-timers we shall vote against you." There was not a member likely to be returned for any textile industrial constituency south of Preston were he to say that he would support a proposal to raise the age. But something had to be done to prepare the pupils for the technical classes.

The CHAIRMAN said he was sorry to have heard the humiliating confession that no Parliamentary candidate in Lancashire would have a chance of being returned if he proposed to raise the age of half-timers. But they must be courageous on that point. He hoped that sound common sense would prevail over even the prejudices of Lancashire. When he entered Parliament children worked in factories in Lancashire at eight years of age. He fought that battle, and got it raised to ten, and it had since been raised to eleven years. There was more opposition both amongst workmen and masters to his original proposal to raise it from eight to ten than there was now to the proposal to abolish it altogether. He intended to take the risk, whatever the consequences might be, of introducing a Bill to abolish the system altogether. He was ashamed, after having been in Parliament thirty years, to contrast our educational

system with that of Switzerland and Belgium, and to think that we in England could not offer the same education to our children that those small States could.

## SOME LIMITATIONS TO TECHNICAL INSTRUCTION.

BY SIR JOSHUA FITCH, LL.D.

In an assembly composed mainly of those who are firmly convinced of the importance of technical instruction, and who are met to concert measures with a view to make such instruction more accessible and more efficient, it may not, it is hoped, seem irrelevant to invite attention briefly to one or two considerations bearing on the relation of such special training to the larger subject of general education, of which, of course, technical instruction forms a part. We can never form a true estimate of the worth of any kind of instruction—manual or intellectual—unless we see it in true perspective and proportion, and know the place it should occupy in a scheme of education which regards man in his totality, and not merely on his industrial or practical side.

We are all agreed that our schools have been for centuries too much absorbed in book-work, in verbal studies which sought to train memory and reasoning only, but which failed altogether to give adequate discipline for the eye and the hand, or to fit the scholar for skilled labour and for practical life. Parliament and public opinion have concurred in desiring to correct and supply this grave defect; and the Technical Instruction Act and the Local Taxation (Customs and Excise) Act are the national expression of a determination to do so. And these measures have already, as we all know, borne abundant fruit. No one can read, for example, the admirable and comprehensive report just presented to the London County Council by its Technical Education Board without seeing how completely the higher trades and the whole work of the skilled artisan in London will be transformed ere long by the well-devised efforts of that Board to give a more scientific character to the instruction of apprentices and workmen, and so to improve the quality of the work done by them. "In the building, engineering, printing, furniture, silver working, and leather trades in particular, the London artisan has now within easy reach, at nominal fees, opportunities for thoroughly perfecting himself in his trade. . . . Drawing, modelling, and design, which are in many respects the most valuable form of technical

instruction for all crafts, are taught in 47 centres, besides many day schools and evening continuation schools." And then in detail the report enumerates the various classes, and the forms of trade work:—

(a). *Building*, with special instruction in bricklaying, brick-cutting, carpentry and joinery, masonry and stone carving, plumbing and plastering, besides practical and theoretical teaching in architecture and design for those who are aiming at the higher branches of the profession.

(b). *The metal trades*, including engineering, electrical fitting, lighting and plating, the work of goldsmiths, jewellers, and workers in silver, iron, and steel.

(c). *Book and printing trades*, including engraving, book-binding, lithography, classes for artistic design, photography, and the application of the several arts concerned in the production of books and illustrated papers.

(d). *The leather trades*, with the arts of tanning, dyeing, and dressing leather.

(e). *Furniture and carriage building*.

(f). *Clothing and upholstery*, which offer a very wide scope for skill, taste, and inventiveness.

The descriptions of the various classes engaged in these occupations, and the details of the various processes employed are full of suggestion and of interest, and inspire all of us with great hope. But every one of these manual employments has at its root some department of science. The nature of the material has to be studied, the laws of the various forces—chemical, mechanical or biological—need to be investigated, and it is an essential part of an intelligent system of technical training that it should be from the first scientific in its character, and not empirical. In all these trades every rule employed which is worth adopting, is founded on some principle or natural law which is worth investigating. But I cannot find in such experience as I have gained in technical institutions that attention enough is given to the scientific truths and principles which underlie the various forms of handicraft, and the knowledge of which makes all the difference between the mere mechanic and the intelligent artisan. I should not like to advocate the too early teaching of the science connected with a skilled trade. Still less does it seem to me to be well to encourage the desire on the part of the young student to accumulate certificates in a certain number of sciences—chemistry, electricity, sound, light

and heat—and so forth. This practice has, unfortunately, been much encouraged in former times by the regulations of the Science and Art Department. It has led to the result that the young scholar measures his success by the number of sciences in which he is able to show a certain elementary knowledge, rather than by his thorough grasp of any one of those sciences, or even by his possession of the scientific temper and spirit at all. What we need is, that when the special *métier* of the student is found, and when he enters an appropriate department of the trade and technical school, he should unite the practice of the manual art and the knowledge of the rules of his craft with a thorough knowledge of the particular science which stands in the closest relation to that craft. All through the reports of the London Technical Committee, and of similar authorities in other parts of the country, I find constant complaints of the imperfect grounding which the students have received, and of the need of more general and cultivated intelligence before technical studies can be entered upon to any good purpose. Thus the report on some of the London Polytechnics calls attention to the importance of better training in workshop arithmetic. "Experience," says the report, "shows this to be a subject in which the young apprentice or artisan is usually very deficient, and this deficiency has been the greatest bar to the progress of the apprentice on entering the technical class." Again in the tailoring and dressmaking departments, where cutting out is indispensable, the report points out the value of a previous knowledge of practical geometry, and deplores the fact that even an elementary acquaintance with this subject has to be gained after the pupils have begun the practical course itself. All this points to the conclusion that there should be greater soundness in elementary knowledge, and that what is wanted is more thoroughness in the ordinary disciplinary work and studies of a good school rather than any premature exercises, specially adapted to anticipate a particular form of technical study.

I should like to learn the opinion of experts and especially of the teachers in technical institutes, as to the expediency of providing by the Education Department a "leaving certificate," which at the age of fourteen might serve to attest that the holder had passed with credit the Seventh Standard and two at least of the optional subjects, and might also serve as a sort of matriculation or entrance examination into a technical or

higher school. This plan will be found at work in France and Belgium and in Germany, where the *certificat d'études* or the *abiturienten-examen* appropriate to the conclusion of the primary school course, is regarded as a necessary condition of admission to further educational privileges, and is also held in high estimation by employers of labour, many of whom require a youth to produce it before entering on employment. At present the practice of individual examination has fallen into disuse in our elementary schools chiefly because experience showed that it was an unsatisfactory way of assessing the money grant. But in the interests of the scholar, no less than in that of the thoroughness and accuracy of the school-work generally, I may suggest that a searching and authoritative individual examination should be instituted at the Seventh Standard; and that a certificate should be granted to those who had attended regularly, had borne a good character, had made a good use of their time and reached the standard of proficiency appropriate to the end of the primary school course. This plan would, I believe, be very welcome to good teachers, to whom it would afford an opportunity of distinguishing themselves. It would certainly be very acceptable to parents. It would greatly facilitate the entrance of promising boys and girls into suitable employment and into the public service. It would have a useful influence on the whole of the school course, and serve as a check upon slovenly teaching, and even possibly—with reverence be it spoken—upon slovenly inspection. It would provide a new motive for regular attendance, and it would certainly give to the conductors of technical and evening schools a better guarantee than they now possess of the fitness of the young scholar to enter upon advanced technical study. I submit to this Conference that its influence might be usefully directed to this point, and that the true co-ordination of elementary school work with the more developed industrial and scientific instruction in which the Conference is most interested, would be secured, in some degree, at least, by the adoption, as an integral part of our elementary school system, of the "leaving examination" at 14, and the award, by the Education Department, through its inspectors, of an appropriate certificate.

Nothing struck me so much in visiting the *apprentice schools*, the *technical schools*, the *Ecoles des arts et métiers*, of the continent, as the constant insistence on the pursuit of

some of the humanising or formative studies, concurrently with the special studies bearing on trade and industry. At the *Ecole Diderot* for boys, and at the *Ecoles professionnelles* for girls, as I have elsewhere shown in an official report,\* one half of the day is devoted to the special teaching and discipline connected with the pupil's selected trade; but the morning of every day is spent in the study of literature, in drawing, in mathematics, in composition of themes, and in general scientific training. No one is admitted to the *atelier*, or work-room, in the afternoon, who does not regularly attend the morning classes, and it is the testimony of the directors of these institutions, that unless the cultivation of the intelligence and the general capacity of the pupil were attended to, *pari passu*, with the hand-work of the apprentice or the trade school, technical instruction would prove incomplete and of small value, and would fail to fulfil even its own highest purpose.

Many of you are familiar with the experience of Socrates, as it is recounted in the *Apologia*. "I betook myself," he says, "to the workshops of the artisans, for here, methought, I shall certainly find some new and beautiful knowledge, such as the philosophers do not possess. And this was true, for the workmen could produce many useful and ingenious things." But he goes on to express his disappointment at the intellectual condition of the artisans; their bounded horizons, their incapacity for reasoning, their disdain for other knowledge than their own, and the lack among them of any general mental cultivation or of any strong love of truth for its own sake. He thought that mere skill in handicraft and mere acquaintance with the materials, and with the physical forces employed in a trade, could carry a man no great way in the cultivation of himself and might leave him a very ill-educated person; that, in fact, the man was more important even than the mechanic or the trader, and that in order to be qualified for any of the employments of life, and to be prepared for all emergencies, mental training should go on side by side with the discipline needed for the bread-winning arts.

We have at hand some more recent experience illustrating the same truth. There has been for many years in our elementary schools one kind of manual and technical work specially subsidised by the State, and indeed enforced as an indispensable con-

\* "Memorandum on the Working of the Free School System in America, France, and Belgium." Presented to both Houses of Parliament, in 1896.



dition of receiving any aid or recognition from the Education Department at all. I mean needlework in girls' schools. It fulfils for girls all the conditions which the advocates of technical instruction have in view for boys. It has unquestionable utility. It affords training for eye and hand. It demands attention, accuracy, and dexterity; and it has an economic value, as a means by which the home may be improved, and money may be earned. It enlists a good deal of sympathy among managers, and the Lady Bountiful or the vicar's wife in a country village is often well content to see the half of every schoolday spent, not indeed in learning to sew, but in manufacturing garments for home use or for sale. It is thought by many good people to be the most appropriate of all school exercises for girls. It seems so domestic, so feminine, so practical. Perhaps it may seem ungracious to inquire too curiously into the effect of this kind of exercise upon the general capacity of the scholars, and upon the formation of their characters. But as a matter of fact, the exercise is often dull and mechanical, it keeps children dawdling for hours over the production of results which, with more skilful and intelligent teaching, might be produced in one-fourth of the time. The place in which the work is done becomes rather a factory than a school, and measures its usefulness rather by the number of garments it can finish than by the number of bright, handy, and intelligent scholars it can turn out. In fact, it is found that proficiency in needlework may co-exist with complete intellectual stagnation, and that the general cultivation of the children, their interest in reading and inquiring has been too often sacrificed to the desire for visible and material results. Some of the sewing is designated with curious irony, *fancy* work. But there is little or no room in it for fancy or inventiveness, or even for the exercise of any originality or taste. So while fully conceding the importance of needlework as an integral part of the primary education of the girls in our schools, I think we are all interested in economising the time devoted to this work, in seeking to employ better methods of obtaining results, and above all in remembering that the educational value of mere handiwork is in itself very limited, and that it ought to be supplemented by other discipline if we desire to make the best of our material and to send into the world capable and thoughtful women, ready for the varied duties of domestic and industrial life.

You will anticipate the inference, which from

my own point of view, as an old inspector of schools and training colleges, I am inclined to deduce from these considerations. I entirely admit that our school instruction has long been too bookish, too little practical, and that the friends of technical instruction are fully justified in calling attention to the grave deficiencies in our system, especially to the want of sounder teaching in physical science, and of better training in the application of those sciences, to the enrichment of the community and to the practical business of life. And we are all agreed, too, in the belief that apart from the industrial and economic results of better manual instruction, there may be in such instruction a high educational purpose, that it may tell on character, awaken dormant faculty, teach the better use of the senses, and increase the power of the human instrument over matter, and over the difficulties of life. Only do not let us exaggerate the educational value of manual instruction, or suppose that all our difficulties are to be solved by turning our schools into workshops. Without co-ordinate intellectual training and development, manual training will only accomplish a part, and not the highest part of the work which lies before the teachers of the future. Let us recognise its necessary limitations. And we can do this in at least two ways, *first*, by aiming at a higher standard of general intellectual culture in the schools from which technical schools are recruited, and thus securing a more solid groundwork for our special instruction. And the *second* expedient is to urge, whenever possible, upon each of the young people in our trade and evening classes, to take up one subject at least—it may be history or mathematics, or philosophy, or a foreign language—which has no direct or visible relation to his trade or to the means whereby he hopes to get a living, but is simply chosen because he likes it, because his own character is enriched and strengthened by it, because it helps to give him a wider outlook upon the world of nature, of books and of men, and because he may thus prepare himself better for the duties of a citizen and a parent, as well as for an honoured place in the ranks of industry.

The CHAIRMAN said he did not know whether there was any disposition to discuss the admirable paper which Sir Joshua Fitch had just read to them. He thought they would perhaps best show their appreciation by carefully reading the excellent principles he had laid down, for he had very opportunely intervened to remind them that a living was not a life, and that the building up of character was as important a function of education as the increase of knowledge.

## L'ENSEIGNEMENT PROFESSIONNEL ET L'INITIATIVE PRIVÉE EN BELGIQUE.

BY OSCAR PYFFEROEN.

Docteur en Droit, Docteur en Sciences politiques et administratives. Professeur à l'Université de Gand.

Les efforts des particuliers pour créer à leurs frais et par leurs sacrifices personnels l'enseignement professionnel se sont manifestés en Angleterre sous la forme de Polytechnics et d'Ecoles techniques grandioses créées à l'aide des millions souscrits ou donnés par les citoyens. L'Allemagne a organisé presque tout son enseignement professionnel, surtout celui des petits métiers et de la petite industrie, par la seule initiative des corporations. D'innombrables écoles de tailleurs, cordonniers, menuisiers, ébénistes, vanniers, coiffeurs, pâtisseries, ramoneurs, ferblantiers, serruriers, peintres, etc., ont été fondées et entretenues par les artisans exerçant ces professions et groupés en corporations. Ce n'est que plus tard, lorsque l'expérience tentée eût prouvé leur viabilité et leurs heureux résultats que quelques-uns des Etats allemands vinrent au secours de ces écoles et leur fournirent de légers subsides, à peine suffisants pour combler le déficit que la meilleure volonté des membres des Corporations ne pouvait prévenir. Plus encore que les gouvernements des Etats, les Administrations Communales, comme celles de Berlin ou de Dresde, allouèrent des subventions à ces œuvres d'instruction technique. Souvent aussi les pouvoirs publics profitèrent de la pénurie de ressources des écoles professionnelles privées pour les reprendre complètement à leur compte, les réorganiser et leur donner un nouvel essor.

En Belgique les tendances de l'esprit public s'inspiraient davantage des mœurs françaises. On attendait presque tout de l'Etat. C'est l'Etat qui a fondé les Ecoles industrielles; elles sont prospères et efficaces. C'est donc aussi à l'Etat, disait-on, à fonder les Ecoles professionnelles. Ainsi raisonnaient ceux-là mêmes qui avaient fondé ou qui entretenaient à leurs frais d'innombrables établissements d'instruction non technique, écoles primaires, écoles moyennes, collèges et universités. Dès qu'il s'agissait d'enseignement professionnel on ne voyait plus que le Dieu-Etat.

Aussi fut-on longtemps à n'avoir qu'une ou deux écoles professionnelles du bois et du fer, notamment à Gand et à Tournai, quelques rares cours professionnels dans les écoles industrielles, et des ateliers d'apprentissage à la campagne pour les textiles et dans le Hainaut pour la taille des pierres.

Que les industriels ou les artisans n'aient pas songé plus tôt à créer des écoles professionnelles, cela s'explique par plusieurs motifs.

Tout d'abord ils ne comprenaient pas assez l'utilité, la nécessité de cette instruction pour y affecter des sommes considérables prises sur leurs propres deniers. Et ceux qui en concevaient l'opportunité estimaient peu sage de faire à leurs propres frais l'éducation professionnelle des autres. Ne pouvant plus, à raison de leur âge ou de leur situation, profiter de cet enseignement, ils aimaient mieux qu'autrui ne pût pas en profiter davantage. Ceux-là mêmes qui étaient convaincus de l'importance pour l'industrie nationale et pour leur personnel en particulier d'une instruction technique suffisante et complète, ne pouvaient se décider à supporter seuls la dépense entière à résulter de l'institution d'écoles utiles à tous.

Depuis quelques années ces objections et ces préjugés disparaissent; la situation tend à changer quelque peu. Le gouvernement lui-même, l'honorable ministre de l'industrie et du travail, M. Nyssens, encourage par tous les moyens l'initiative privée; il s'efforce de la susciter par l'espérance d'un appui financier. Les Rapports sur l'Enseignement Professionnel en Angleterre et en Allemagne que j'ai été chargé de présenter à M. le Ministre et qu'il a bien voulu faire publier ont, entre autres, pour but de montrer les résultats obtenus dans ces deux pays par le concours des particuliers ou par leur seule initiative. Aussi peut-on dire que nos écoles professionnelles se sont multipliées dans une forte proportion depuis quelques années, et que de grands progrès ont été réalisés en peu de temps.

Le subside de l'Etat pour l'enseignement industriel et professionnel a été presque doublé depuis la création du ministère de l'industrie et du travail; dans le budget de 1898, il s'élèvera à 850,000 francs. Il sert en grande partie à soutenir les établissements libres.

A l'heure actuelle l'initiative privée se manifeste en matière d'enseignement professionnel sous trois ou quatre formes principales.

Tout d'abord on a vu quelques *groupes d'artisans ou d'ouvriers*, réunis en Syndicats ou spécialement associés pour cet objet, décider la création d'écoles de métiers et solliciter à cet effet les subsides de l'Etat des communes ou des provinces. Eux-mêmes ne supportaient qu'une très faible part des charges financières. C'étaient en général des patrons, convaincus du besoin de suppléer à la décadence de l'apprentissage, peu désireux de former des ap-

prentis à domicile suivant l'ancien régime ; ils constituaient un comité de patronage de l'école à créer, se chargeaient de la surveillance et de l'administration, et se réservaient la nomination des professeurs. Ainsi furent créées entre autres les écoles de tailleurs à Bruxelles et Liège, les écoles de tapissiers-garnisseurs, d'horlogers, de bijoutiers et de coiffeurs à Bruxelles, d'armuriers à Liège, les écoles de brasserie à Gand. L'école de typographie de Bruxelles a été créée par un syndicat d'ouvriers, également à l'aide des subsides des pouvoirs publics.

L'origine de ces diverses écoles fait qu'elles sont demeurées autant d'écoles séparées. On ne trouve pas, comme dans les Polytechnics et les Ecoles anglaises, tout cet enseignement concentré entre les mêmes mains, sous une direction unique. De là une grande variété dans les méthodes, les heures de cours, les conditions d'admission.

Le plus souvent ce sont des écoles du jour, c'est-à-dire des ateliers d'apprentissage plutôt que de simples cours professionnels. Les élèves sont tenus de rester toute la journée à l'école pendant plusieurs années. Ce n'est nullement le système si pratique adopté en Angleterre : l'apprentissage à l'atelier, complété par l'instruction théorique et pratique à l'école ; ce n'est pas l'école complètement de l'atelier ; c'est au contraire l'école se substituant à l'atelier, prétendant former chez elle des ouvriers tout faits.

Il en résulte que l'on est en général obligé de payer les élèves pour les faire venir à l'école. Privés de tout salaire industriel pendant les deux ou trois années de cours à l'école, les apprentis tailleurs, par exemple, réclament en compensation une sorte de salaire pour le travail qu'ils font aux ateliers scolaires. Sans cette indemnité les parents refuseraient d'envoyer leurs enfants à l'école et préféreraient les faire travailler dès le premier jour à l'atelier d'un patron. Même malgré cette rémunération attachée au travail de l'élève, beaucoup de parents ne peuvent se résigner au sacrifice d'un salaire plus élevé et plus immédiat que procurerait le travail à l'usine. D'autre part dans la petite bourgeoisie, cette classe de la population qui vit essentiellement des petits métiers, il existe une forte opposition contre les ateliers scolaires à raison même de leur organisation en écoles du jour. Travaillant toute la journée, ces écoles produisent parfois beaucoup. Elles ne sont pas au même titre que les particuliers soumis au régime de la concurrence commerciale ; elles peuvent vendre leurs travaux à toute offre

acceptable. Dès lors les petits patrons se plaignent de la concurrence que leur font ces établissements subsideés par les pouvoirs publics à l'aide de l'argent des contribuables.

A ces diverses objections il serait certes facile de remédier, et je me hâte de dire que bon nombre de nos écoles professionnelles y échappent. Il suffit d'organiser l'enseignement professionnel théorique et pratique dans des cours du soir. Cela permet la fréquentation des cours à ceux qui travaillent durant la journée chez leur patron, gagnent un salaire proportionné à leurs forces et à leur habileté, et qui viennent après leur journée de travail, se perfectionner aux classes et aux ateliers scolaires, y apprendre ce qu'à l'atelier le patron ou le contremaître n'a pas voulu ou n'a pas su leur expliquer. Cela dispense aussi les ateliers scolaires de jeter sur le marché le produit du travail de leurs élèves ; car ce travail ne se borne plus alors qu'à trois ou quatre heures par semaine, et la question du placement des objets manufacturés ne se pose plus.

L'école de typographie, de Bruxelles, par exemple, est une école du soir. Les ouvriers qui l'ont fondée se sont bien rendu compte sous ce rapport de la réalité de leurs besoins économiques. Chez eux aussi, à la différence de ce qui existe d'habitude ailleurs, on n'admet aux cours pratiques que ceux qui exercent déjà la profession dans laquelle ils veulent venir se perfectionner à l'école. Le syndicat ouvrier a voulu que l'école professionnelle ne servît pas à augmenter d'une façon artificielle le nombre de bras dans la profession, mais qu'elle contribuât à améliorer l'ouvrier, à accroître sa valeur productive, et par conséquent à lui faire mériter de plus hauts salaires. On a vu, au contraire, dans une autre industrie, la métallurgie, une crise économique grave éclater à propos d'une école professionnelle qui avait formé dans des cours du jour un grand nombre de jeunes apprentis. Ces nouveaux éléments, jetés tout coup dans la circulation, c'est-à-dire entrant tous au même moment dans les ateliers, venaient y déprécier les salaires, occuper la place d'ouvriers faits, susciter la jalousie des compagnons. De là une grève qui eut les plus fâcheuses conséquences pour l'industrie.

Quoiqu'il en soit, à part quelques réformes de détail dans leur organisation, ces écoles professionnelles, qui ressemblent beaucoup aux écoles de corporations allemandes, sont utiles, elles se développent constamment et leur nombre augmente d'année en année.

Un autre type de créations de l'initiative

privée, type que je pourrais qualifier d'essentiellement belge, ce sont les établissements fondés par les congrégations religieuses. J'en signalerai trois principales catégories.

Les Académies de dessin et *Ecoles professionnelles Saint Luc* sont la première et la plus importante de ces catégories. Elles sont dirigées par les Frères de la Doctrine Chrétienne ; il en existe à Gand, Tournai, Liège et Bruxelles. Elles ont d'abord pour but, notamment dans l'esprit de leur fondateur, feu le baron Béthune, de renover l'art gothique en notre pays. Aujourd'hui quelques-unes au moins d'entre elles sont devenues plus éclectiques, et elles s'attachent à appliquer aux beaux-arts, surtout à l'architecture, des principes conformes aux différentes ressources et aux divers matériaux du pays. La plupart des Ecoles Saint Luc ne sont que des écoles de dessin et d'enseignement professionnel théorique, elles s'efforcent d'enseigner les métiers et les arts industriels par l'étude du dessin. Il en est toutefois qui sont allés plus loin. Telle l'Ecole de Tournai, qui a installé d'excellents ateliers de travaux pratiques. A Gand, les élèves de l'Ecole Saint Luc sont placés par les soins de leurs maîtres, les Frères de la Doctrine Chrétienne, auprès de patrons intelligents et dévoués chez lesquels l'ancien mode apprentissage est resté en honneur. Jusqu'à une époque toute récente les Ecoles Saint Luc subsistaient sans aucun subside officiel. L'octroi de semblables subsides leur permettra désormais de prendre un nouvel essor.

Les Ecoles Saint Luc sont exclusivement des écoles d'externes. En même temps, l'enseignement professionnel acquérait une place assez considérable dans quelques *pensionnats tenus par des religieux*. Il en était surtout ainsi dans des orphelinats et collèges destinés aux enfants pauvres et aux fils de famille peu aisés, c'est-à-dire à ces jeunes gens qui devront vivre plus tard du travail de leurs mains. Il est rationnel en effet de leur apprendre un métier plutôt que le latin et le grec, que la littérature ou d'autres branches qui ne leur serviront de rien par la suite, et les détourneront plutôt de la profession pour laquelle ils sont tout indiqués.

Il existe actuellement des cours théoriques et pratiques de tailleurs, cordonniers, menuisiers, imprimeurs, relieurs, voire même de plombiers, serruriers et horlogers auprès de divers collèges : nous citerons seulement ceux des Prêtres Salésiens à Liège (Œuvre de dom Bosco), des Frères de Notre Dame de Lourdes à Oostacker et Maltebrugge. Tandis que les

premiers sont restés des écoles d'internes, dont l'école de métiers n'est accessible qu'aux pensionnaires, les seconds ont fait un pas de plus dans la voie du progrès. Ils ont rendu leurs cours et ateliers accessibles aux élèves externes, et en particulier à ceux qui se trouvent en apprentissage chez quelque artisan du dehors et veulent venir se perfectionner chez les Frères.

Ces ateliers scolaires travaillent tous durant la journée entière. Les Frères font exécuter des travaux pour leur congrégation ou des commandes qu'ils parviennent à obtenir de la clientèle privée. Les jeunes gens ne touchent aucun salaire ; mais ils sont logés, vêtus et nourris par l'établissement. Ils restent chez les Frères pour y faire leur apprentissage pendant cinq ou six ans. La longue durée de cet apprentissage, l'absence de stimulant chez les jeunes gens formés dans ces écoles, où ils demeurent nécessairement étrangers aux conditions de production des ateliers industriels, sont les objections principales que l'on fait, à tort ou à raison, à ce mode d'instruction. On reproche aussi parfois à ces établissements de faire la concurrence à l'industrie privée ; mais c'est là un grief qui ne porte pas contre l'enseignement professionnel proprement dit, mais contre ce que l'on appelle communément le travail des couvents. Or il est certes difficile, en saine économie politique, d'empêcher une classe de citoyens de vivre en se contentant de peu, et de produire, grâce à leur sobriété, à des conditions plus avantageuses.

Ce que ces établissements de Frères sont pour les jeunes gens, les *ouvroirs* le sont pour les jeunes filles. On appelle ainsi des ateliers tenus le plus souvent par des religieuses, parfois aussi par des dames laïques, où les jeunes filles peuvent venir s'exercer aux travaux manuels, apprendre la couture, la confection, la coupe, la broderie. D'ordinaire le produit du travail sert à couvrir les frais de l'ouvroir, et il y suffit dans la plupart des cas. La charité privée supplée, au besoin, au déficit. Ces ouvroirs existent de longue date.

Nous y rattacherons les *écoles ménagères*. Toutes nos villes et beaucoup de localités rurales ont aujourd'hui des cours d'économie domestique, des classes de cuisine et de lessivage ; elles sont rattachées le plus fréquemment aux écoles primaires de filles, aussi bien aux écoles libres qu'aux écoles communales. Des dames patronesses parmi lesquelles on compte l'élite de la noblesse et des membres de la famille royale, s'intéressent à ces œuvres,

les encouragent de leur présence, les surveillent, et subviennent à une bonne partie de leurs dépenses.

*L'enseignement commercial* a donné lieu à d'autres formes d'activité de l'initiative privée. La Belgique possédait depuis longtemps un établissement de premier ordre, l'Institut Supérieur de Commerce d'Anvers, qui est une école de l'Etat. Tout récemment deux institutions similaires se sont fondées par l'initiative des particuliers : à la Louvière, un collège religieux s'est annexée une section de sciences commerciales qui veut égaler et même dépasser Anvers, et à Liège un projet analogue a été conçu. Ajoutons que la Maison de Melle-lez-Gand a créé aussi une Ecole de Commerce excellente.

Au degré élémentaire de l'instruction commerciale, c'est encore l'initiative privée qui est venue combler les lacunes.

Dans les villes commerçantes, le besoin s'était fait sentir pour la nombreuse catégorie des commis et employés d'une part, pour les détaillants et négociants d'autre part, d'avoir des connaissances plus approfondies en langues étrangères, comptabilité et tenue de livres, sciences commerciales. Cet enseignement, qui existe d'une façon si complète à Londres, par exemple, dans les Polytechnics, manquait encore, ou n'était pas suffisamment rendu accessible au public. Il s'est donc créé des institutions qui se sont donné pour but de dispenser cet enseignement dans des cours du soir, à des prix extrêmement réduits, abordables pour tous. Ce fut le *Cercle Polyglotte* de Liège qui donna l'exemple. Il possède à lui seul 500 élèves et membres, qui tous paient leur cotisation. Il fut bientôt suivi d'institutions analogues dans les autres villes. Les associations de voyageurs et syndicats d'employés ont aussi, dans plusieurs villes, ouvert des cours du soir de langues étrangères, auxquels le gouvernement accorde d'assez larges subsides.

Nous ne prétendons pas avoir énuméré toutes les formes d'action de l'initiative privée dans le domaine de l'enseignement professionnel. Il est impossible que semblable énumération soit complète, puisque ces formes varient à l'infini et que de nouvelles combinaisons se trouvent tous les jours. Il serait encore plus difficile de produire des chiffres relativement au budget ou au nombre d'élèves ou de professeurs des écoles libres, d'autant plus que la statistique de notre enseignement professionnel et industriel n'a plus paru depuis 1884.

Une ou deux autres constatations s'imposent encore à l'observateur impartial, desirieux de se rendre complètement compte de l'influence de certains groupes de particuliers sur le développement de l'enseignement professionnel.

L'esprit de *parti* s'est mêlé à l'instruction technique, dans un sens qui, par exception produit ici d'heureux résultats. Tel syndicat socialiste ou antisocialiste crée pour ses membres des cours de peinture ou de couture : c'est le système de l'instruction mutuelle, qui peut être non moins fécond que celui de l'assurance mutuelle.

Là où elles ne fondent pas de cours distincts, associations de caractère principalement politique engagent leurs membres à suivre les cours des écoles industrielles et professionnelles : c'est le cas pour les syndicats socialistes à Gand, l'union professionnelle des tisserands supporte même les frais que la fréquentation des cours peut occasionner à ses membres, tels que les achats de livres et fournitures classiques.

Il est plus rare de voir les *grands industriels* favoriser notre enseignement industriel de largesses princières comme les anglais ont coutume de le faire à leurs Ecoles Techniques. Le seul exemple que l'on puisse citer dans ce sens est celui de Verviers, où les listes de souscription ont produit des centaines de mille francs. A cet égard nous envions même ce qui a été fait dans le Nord de la France, à Roubaix et à Tourcoing, où, sans la moindre subvention gouvernementale, départementale ou municipale, ont été fondées de remarquables écoles de filature, de tissage et de teinture.

Tel est l'état actuel des œuvres de l'initiative privée en ce qui concerne l'instruction technique. Si elles ont pu prendre un développement aussi varié, c'est grâce à nos institutions libérales et aux encouragements bienveillants des pouvoirs publics. Nous n'avons pas encore de législation régulière sur l'enseignement professionnel, comme il en existe pour l'enseignement primaire, moyen et supérieur. Jusqu'à présent on n'a procédé qu'empiriquement. Il semble que la tendance, en fait, soit d'appliquer à l'instruction technique le principe en vigueur pour l'instruction primaire : l'octroi de subsides assez élevés aux écoles libres en même temps que le maintien, aux frais de l'Etat, des provinces et des communes, d'écoles officielles, qui serviront aux autres de modèles ou de stimulants, ou qui combleront tout simplement les lacunes de l'initiative privée.

Enfin il est une réforme qui se réalisera peut-être à une date prochaine et qui pourra donner

une forte impulsion à la création d'écoles professionnelles : c'est l'octroi de la personification civile. Dans le droit actuel, les écoles libres ne sont pas des êtres juridiques, elles ne peuvent ni recevoir ni donner, ni être propriétaires. Elles ont une situation instable ; leur avenir n'est pas assuré. L'Angleterre a trouvé le système si pratique des *trust committees*, administrant les écoles avec une entière liberté. Nous attendons impatiemment en Belgique d'être dotés d'un pareil organisme, et de la reconnaissance juridique des établissements d'instruction professionnelle.

## L'ENSEIGNEMENT TECHNIQUE ET COMMERCIAL EN BELGIQUE.

PAR EDOUARD SÈVE.  
Consul-General for Belgium.

### I.

Le Comité du Congrès de l'Enseignement Technique m'a fait l'honneur de me demander un rapport sur la Belgique.

Le Ministre de l'Industrie et du Travail, M. M. Nyssens, a délégué pour représenter officiellement le Gouvernement du Roi à ce Congrès : M. Eugène Rombaut, l'éminent Inspecteur Général de l'enseignement industriel et professionnel du royaume, connu de tous ceux qui se préoccupent de la diffusion de l'instruction technique et manuelle : M. Wauters, l'Inspecteur-adjoint de la même administration et M. Oscar Pyfferoen, professeur à l'université de Gand, docteur en droit, docteur en sciences politiques et administratives, auteur d'un remarquable rapport sur l'enseignement professionnel en Angleterre publié par la direction de l'industrie, du ministère de l'industrie et du travail ; ces messieurs fourniront au Congrès tous les renseignements désirables sur l'organisation de nos établissements et leurs programmes.

Je me contenterai donc d'exposer à grands traits ce que nous avons fait en Belgique me tenant entièrement à la disposition de ceux des membres du Congrès qui désirent obtenir de plus amples informations sur le fonctionnement de nos universités et instituts et de nos écoles.

Me plaçant au point de vue belge et partageant l'opinion de M. Pyfferoen, je pense qu'il faut entendre par enseignement professionnel cette instruction qui prépare plus particulièrement à l'exercice des professions manuelles, des métiers et du commerce et je me rallie à son indication de classification de l'enseignement technique. Nos Ecoles pro-

fessionnelles constituent le degré élémentaire de cet enseignement ; les Ecoles industrielles le degré moyen ; enfin, les Ecoles des arts et manufactures, les Ecoles des mines, les Ecoles du génie civil annexées à nos universités, le degré supérieur.

### II.

Aucun document officiel ne nous renseigne sur la situation générale de l'enseignement industriel et professionnel depuis 1884. Le prochain rapport est sous presse ; il paraîtra cette année.

L'organisation de l'enseignement supérieur en Belgique a pour base l'article de la Constitution qui décrète la liberté d'enseignement.

Nous avons actuellement 4 Universités, 2 appartenant à l'Etat, celle de Liège et celle de Gand, et 2 Universités libres, l'une à Louvain, l'autre à Bruxelles.

Les Universités comprennent plusieurs facultés :—Philosophie ès lettres, droit, sciences et médecine ; l'Université de Louvain possède, en plus, une faculté de théologie, placée sous la haute surveillance de l'épiscopat catholique belge et l'Université de Bruxelles a joint, depuis 1873, à sa faculté des sciences, une école polytechnique destinée à enseigner les applications des sciences aux arts et à l'industrie, comprenant les sections suivantes : exploitation des mines, métallurgie, chimie industrielle, construction des machines, génie civil, architecture.

Les Universités délivrent des certificats ou des diplômes de candidat et docteur en sciences naturelles, en sciences physiques et mathématiques. Le diplôme mentionne si le récipiendaire a subi l'examen d'une *manière satisfaisante*, avec *distinction*, avec *grande distinction*, ou avec *la plus grande distinction*. Tout examen est public.

Un certain nombre d'écoles supérieures sont venues se grouper autour des facultés universitaires ; l'enseignement professionnel est rattaché aux facultés des sciences.

Les Universités belges possèdent chacune des Ecoles spéciales d'ingénieurs et d'architectes ; mais les deux Universités de Liège et de Gand ont seules le privilège de préparer des ingénieurs pour le service de l'Etat : celle de Liège assure le recrutement des ingénieurs des mines, celle de Gand celui des ingénieurs et conducteurs des ponts-et-chaussées.

L'Ecole des arts et manufactures et des mines de Liège, dont l'origine remonte à 1825, comprend actuellement quatre divisions :—*L'Ecole des mines, l'Ecole des arts et manu-*

*factures, la section des élèves mécaniciens, et la section des élèves électriciens.* Ces quatre divisions de la faculté technique conduisent respectivement aux diplômes—

1. d'Ingénieur honoraire ou d'Ingénieur civil des mines ;
2. d'Ingénieur civil des arts et manufactures ;
3. d'Ingénieur civil mécanicien ;
4. d'Ingénieur électricien.

L'enseignement est très fortement organisé ; des collections de modèles extrêmement riches, des laboratoires bien montés, un personnel assistant considérable sont à la disposition des étudiants ; des excursions dans les mines et dans les usines si nombreuses dans la province de Liège complètent l'instruction technique.

L'enseignement de l'électricité appliquée a pris dans ces dernières années une grande extension.

Une Ecole spéciale du génie civil est annexée à l'Université de Gand : la division inférieure est consacrée à la formation de conducteurs et la division supérieure à la formation d'ingénieurs ; une partie du semestre d'été est réservée aux exercices pratiques, à la connaissance des professions qui ont pour objet l'emploi de la pierre, du bois ou du fer dans les constructions.

A côté de l'*Ecole du génie civil*, l'Université de Gand possède une *Ecole des arts et manufactures* destinée aux élèves qui veulent obtenir le diplôme d'Ingénieur industriel ; cette école embrasse, dans le cadre de son instruction, tout le système des connaissances nécessaires pour l'application des sciences aux procédés généraux de l'industrie et aux principales branches des fabrications spéciales. Elle comprend une division préparatoire aux deux années d'étude et une division d'application désignée sous le nom d'Ecole spéciale des arts et manufactures dans laquelle les études durent également deux années.

L'Ecole des arts et manufactures est accessible aux élèves de toutes les nationalités.

A la faculté des sciences de l'Université de Louvain sont rattachées, depuis 1865, une *Ecole spéciale des arts et manufactures*, du *génie civil et des mines*, et une *Ecole supérieure d'agriculture*.

La première comprend cinq sections :—

L'exploitation des mines, métallurgie, chimie industrielle, génie civil, constructions mécaniques.

Les élèves qui suivent les cours scientifiques, techniques et pratiques sont partagés en trois catégories pour l'obtention des diplômes.

Les programmes comprennent un cours

d'applications industrielles de l'électricité et des visites aux établissements où elles sont réalisées.

Les cours de l'Ecole d'agriculture ou Institut agronomique durent trois années.

Les Ecoles spéciales annexées aux Universités dont je viens de parler comprenaient, en 1895, une population qu'il est intéressant de constater.

Sur 640 élèves fréquentant l'Université de Gand, 216 figurent dans les écoles spéciales, soit 145 pour le génie civil et 71 pour les arts et manufactures. A l'Université de Liège, sur un nombre total d'étudiants de 1,248, 222 fréquentant la Faculté technique, titre donné par la loi du 30 Juin 1893, aux écoles spéciales des arts et manufactures et des mines. L'Université de Louvain, sur un total de 1,636, comprend 433 étudiants fréquentant les écoles spéciales, enfin l'Université de Bruxelles, sur un total de 1,311 étudiants en compte 139 fréquentant l'Ecole polytechnique. Sur un total de 4,835 étudiants fréquentant les cours des quatre Universités, 937 sont attachés à la faculté des sciences et 1,010 sont inscrits à la faculté technique de Liège et aux écoles spéciales.

Vous trouverez dans les rapports triennaux, dus à la plume de l'éminent directeur général van Camp, enlevé si prématurément le 4 mai dernier à la direction de l'enseignement supérieur, des lettres et des sciences, sur l'état de l'enseignement supérieur des lettres et des sciences officiel et dans les archives du ministère de l'Intérieur et de l'Instruction Publique tous les renseignements sur les Universités belges et particulièrement sur les examens subis devant les facultés des quatre Universités du royaume et devant les jurys constitués par le Gouvernement pour l'obtention des grades académiques.

Parmi les moyens de favoriser les hautes études en Belgique il y a lieu de signaler les bourses accordées aux jeunes gens peu fortunés qui manifestent des aptitudes et de l'application au travail. Les associations des Anciens Etudiants des Universités de Louvain et de Bruxelles allouent également des bourses. Le Gouvernement confère chaque année, à la suite de concours, des bourses de voyage destinées à fournir aux lauréats le moyen de compléter leurs études pendant une année dans les universités de l'étranger.

Un Conseil de perfectionnement de l'enseignement supérieur est appelé à délibérer sur les questions les plus importantes qui intéressent la prospérité des études universitaires.

L'Académie royale des sciences, des lettres et des beaux-arts de Belgique, qui a son siège à Bruxelles et dont le Roi est le protecteur, est divisée en trois classes; ses travaux comportent la mise au concours de questions qui touchent de près au développement de l'enseignement technique et professionnel.

### III.

A côté des universités et des écoles annexes, nous avons en Belgique plusieurs établissements qui doivent être rangés parmi ceux d'enseignement supérieur et qui ont particulièrement pour objet l'enseignement pratique et théorique :

Dans le domaine agricole, l'Institut de Gembloux; dans le domaine maritime, les Ecoles de navigation; dans le domaine militaire, les Ecoles de guerre; dans le domaine commercial, l'Institut supérieur de commerce d'Anvers; et dans le domaine artistique, les Académies royales des Beaux-Arts d'Anvers et de Bruxelles et les Conservatoires de Musique.

Je les passerai rapidement en revue.

*Beaux-Arts.* — L'Ecole des Beaux-Arts, fondée à Anvers en 1663, est administrée par le Gouvernement et le conseil communal sous le titre d'Académie royale des Beaux-Arts d'Anvers; elle est divisée en deux sections : — L'Institut Supérieur et l'Académie proprement dite. L'enseignement, gratuit à tous les degrés, se donne dans les deux sections pendant neuf mois consécutifs : du 1<sup>er</sup> octobre au 30 juin.

L'Institut comprend l'enseignement supérieur complet des arts graphiques et plastiques, tandis que l'Académie proprement dite donne surtout l'enseignement élémentaire des arts du dessin et l'enseignement moyen des arts graphiques et plastiques.

L'Académie royale des Beaux-Arts et l'Ecole des Arts décoratifs de Bruxelles donnent l'enseignement du dessin, de la peinture, de la sculpture, et de l'architecture dans toutes leurs applications ainsi que les sciences nécessaires à la culture de chacune de ces branches. L'enseignement de l'Académie est consacré à l'étude des beaux-arts; celui de l'Ecole des arts décoratifs, aux applications des arts plastiques à l'industrie.

Le Conservatoire de Bruxelles, fondé en 1832, qui a eu à sa tête l'illustre François Fétis, et possède aujourd'hui pour directeur l'éminent compositeur Gévaert est, sans contredit, la première école de musique du monde. C'est une vraie université musicale à laquelle

est attachée un musée instrumental aussi remarquable que complet.

Le Conservatoire de Liège qui a pour directeur, M. Théodore Radoux, celui de Gand dirigé par Mons. Adolphe Samuel, l'Ecole flamande de musique à la tête de laquelle se trouve Pieter Benoit, l'un des compositeurs les plus richement doués, l'Académie de musique de Mons, l'Ecole de Louvain, le Conservatoire de Bruges possèdent un enseignement également renommé dans le monde musical.

Les Conservatoires royaux de Belgique comprenaient, au dernier recensement, la population suivante : Bruxelles 765 élèves dont 436 hommes et 329 femmes; Liège 736 élèves dont 498 hommes et 238 femmes; Gand 558 élèves dont 278 hommes et 280 femmes.

Indépendamment des Conservatoires royaux, il y a plus de 225 établissements d'instruction musicale et sur ce nombre 50, fréquentés par 11,571 élèves dont 6,645 hommes et 4,925 femmes, sont des institutions communales subventionnées par l'Etat et soumises à l'inspection du gouvernement.

Une des causes principales du développement artistique de la Belgique doit être assignée à l'organisation de l'enseignement des académies d'art, des conservatoires, des écoles de dessin : l'importance et la valeur artistique de plusieurs de nos institutions ne sont dépassées nulle part.

L'intervention des pouvoirs publics encourage la culture nationale du goût et les progrès dans le domaine de l'enseignement artistique de l'homme comme de la femme. Toutes les années ils organisent des solennités musicales, des expositions des beaux-arts et accordent de larges subsides aux expositions régionales et internationales où les élèves diplômés de nos institutions d'enseignement supérieur trouvent l'occasion de se distinguer.

*Agriculture.* — Le premier des établissements d'instruction agricole fondés aux frais de l'Etat et avec le concours du Gouvernement par une loi du 18 juillet 1865, est l'Institut Agricole de l'Etat établi à Gembloux, province de Namur.

L'enseignement donné à l'Institut est théorique et pratique.

L'enseignement théorique embrasse les cours suivants : génie rural, sciences physiques et chimiques, histoire naturelle, culture, silviculture, zootechnie, législation rurale et forestière et droit constitutionnel, comptabilité agricole, économie politique, analyse microscopique. L'enseignement pratique comprend toutes les applications des cours qu



précèdent dans une ferme d'une étendue de plus de 65 hectares, des jardins et des champs d'expériences et de démonstrations.

La Station agronomique et laboratoire d'analyses de l'Etat de Gembloux a pour but d'entreprendre des recherches de chimie et de physiologie végétale et animale appliquées à l'agriculture et d'exécuter les analyses.

Chaque année un jury procède à l'examen des élèves qui désirent obtenir le diplôme d'ingénieur agricole; des subsides spéciaux sont accordés aux candidats qui ont subi l'examen de sortie avec le plus de distinction, afin de leur permettre de compléter leurs études par des voyages à l'étranger.

*Commerce.*—Le programme du Congrès ayant une section spéciale pour l'instruction commerciale, je parlerai plus loin de l'Institut Supérieur de Commerce d'Anvers.

#### IV.

J'ai dit plus haut qu'aucun document officiel ne nous renseignait sur la situation spéciale de l'enseignement industriel et professionnel depuis plus de dix ans; la province de Hainaut publie chaque année un rapport fort complet et fort intéressant sur les progrès de son instruction technique durant l'exercice écoulé. Sans aucun doute ce travail fera partie des documents qui seront mis sous les yeux du Congrès par les délégués du Gouvernement belge. L'enseignement professionnel est donné dans la province de Hainaut dans 18 établissements dont 2 ont été créés en 1895. Six ou sept communes appartenant à quatre arrondissements se préparent à créer de nouvelles écoles; il y a donc lieu de constater dans cette province qui compte actuellement les meilleures et les plus nombreuses écoles un fort mouvement en faveur de la diffusion de l'enseignement industriel.

La population scolaire de ces établissements suit une progression sans cesse ascendante: au premier janvier, 1896, le nombre des élèves était de 6,043, soit de 13 % supérieur à celui du premier janvier, 1895.

Les subsides accordés par l'Etat à l'enseignement industriel et professionnel sont, pour 1897, de 750,000 francs.

Ces écoles industrielles comprennent des cours théoriques de mathématiques et sciences, de langues modernes, des cours de dessin appliqué à l'industrie et des cours professionnels proprement dits.

Les provinces et les communes et plusieurs établissements industriels importants octroyent également des subsides à l'enseignement technique et professionnel.

Nous avons vu la place qui est donnée à l'étude des arts et des sciences dans l'enseignement supérieur. Nous aurions dû comprendre dans cette nomenclature l'Ecole provinciale et des mines du Hainaut établie à Mons en exécution de la résolution du conseil provincial du 13 juillet, 1837, dirigée actuellement par M. le professeur A. Macquet. La preuve en sera mise sous vos yeux par la nomenclature des cours qui sont donnés dans cette école qui fait honneur à la Belgique: Physique industrielle; électricité; électrotechnique; minéralogie et géologie; économie politique; exploitation des chemins de fer; constructions des machines; construction des chemins de fer, routes; exploitation des mines; dessin industriel; géométrie descriptive; charpente et stéréotomie; topographie; métallurgie; chimie industrielle minérale; chimie minérale; docimasia et chimie analytique, droit public et industriel, législation des mines; chimie organique, élémentaire et expérimentale; chimie organique; algèbre, géométrie analytique, calcul différentiel et intégral; mécanique élémentaire; mécanique appliquée et thermodynamique; constructions civiles et résistances des matériaux; physique expérimentale; dessin géométrique et industriel.

Voici, par province, la nomenclature des écoles industrielles:

*Province d'Anvers.*—Ecole industrielle d'Anvers, organisée par arrêté ministériel du 14 novembre, 1866. Ecole professionnelle pour jeunes filles à Anvers, organisée par arrêté ministériel du 30 avril, 1880.

*Province de Brabant.*—Ecole de dessin et école industrielle réunies, Anderlecht; Ecole professionnelle et ménagère à Braine-L'Alleux; Ecole industrielle à Bruxelles, organisée en suite de la convention du 28 juin, 1886, entre l'Etat et la ville de Bruxelles; Ecole professionnelle d'art appliqué à la bijouterie et à la ciselure, Palais du Midi, Bruxelles; Ecole nationale d'horlogerie; Ecole professionnelle de tailleurs, à Bruxelles; Ecole professionnelle de tapissiers-garnisseurs, à Bruxelles; Ecole professionnelle de typographie, à Bruxelles; Ecole professionnelle pour jeunes filles, à Bruxelles; Ecoles professionnelles et ménagères à Bruxelles; Ecole professionnelle pour jeunes filles à Bruxelles; Ecole ménagère et professionnelle à Heverlé (Louvain); Ecole professionnelle à Ixelles; Ecole professionnelle des minimes, à Louvain; Ecole professionnelle de St. Pierre à Louvain; Ecole industrielle à Louvain; Ecole industrielle à Nivelles; Ecole professionnelle de St. Gilles; Ecole profession-

nelle ménagère communale à St. Gilles; Cours professionnels pour jeunes filles à St. Josse-ten-Noode; Ecole de Saint-Luc à Schaerbeek; Ecole professionnelle pour jeunes filles à Schaerbeek; Ecole de dessin et d'industrie à Schaerbeek; Ecole professionnelle et ménagère communale à Schaerbeek; Ecole professionnelle d'Uccle; Ecole de dessin et industrielle réunies de Vilvorde.

*Province de Flandre occidentale.*—Ecole professionnelle de pêche à Blankenberghe; Ecole industrielle et académie de dessin y annexée, à Courtrai; Ecole industrielle de Furnes; Ecole professionnelle de pêche à Nieuport; Ecole industrielle à Ostende; Ecole professionnelle de pêche à Ostende; Ecole industrielle à Ypres.

*Province de Flandre orientale.*—Ecole professionnelle de peinture décorative d'Audenarde; Institut Supérieur de brasserie, à Gand; Ecole technique de Brasserie, à Gand; Ecole industrielle, à Gand; Ecole professionnelle de garçons, à Gand; Ecole professionnelle de jeunes filles, à Gand; Ecole Saint-Luc, à Gand; Ecole professionnelle de jeunes filles à Grammont; Ecole professionnelle des frères de N.-D. de Lourdes, à Oostacker; Ecole industrielle de Saint Nicolas.

*Province de Hainaut.*—Ecole industrielle, à Ath; Ecole professionnelle et ménagère à Ath; Ecole industrielle à Boussu; Ecole industrielle, à Charleroi; Ecole industrielle, commerciale, et de dessin de Chatelet; Ecole industrielle de Dour; Ateliers d'apprentissage pour la taille des pierres, à Ecaussinnes-Enghien; Ecole industrielle de Fontaine-L'Evêque; Ecole industrielle de Gosselies; Ecole industrielle à Houdeng-Aimeries; Ecole industrielle de Jemappes; Ecole industrielle, à Jumet; Ecole industrielle de La Louvière; Ecole de brasserie de La Louvière; Ecole industrielle à Marchienne-au-pont; Ecole professionnelle de jeunes filles, à Mons; Ecole industrielle à Morlanvelz; Ecole industrielle à Pâturages; Ecole industrielle, à St. Ghislain; Ecole industrielle à Soignies; Ecole industrielle à Tournai; Ecole professionnelle St. Luc, à Tournai; Ecole ménagère professionnelle de Tournai.

*Province de Liège.*—Ecole sucrière à Glons; Ecole de dessin industriel, à Herve; Ecole industrielle, à Huy; Ecole industrielle, à Liège; Ecole professionnelle de St. Luc, à Liège; Ecole professionnelle de tailleurs, à Liège; Ecole professionnelle d'armurerie à Liège; Ecole industrielle, à Seraing; Ecole

Supérieure des textiles et école professionnelle à Verviers; Ecole professionnelle pour jeunes filles, à Verviers.

*Province de Limbourg.*—Académie de dessin et école industrielle, à Hasselt.

*Province de Luxembourg.*—Académie des beaux-arts et école industrielle, à Arlon.

*Province de Namur.*—Ecole industrielle, à Namur; Ecole industrielle, à Tamines; Ecole industrielle, à Walcourt.

Les ateliers d'apprentissage sont au nombre de 32: 22 dans la Flandre occidentale; 8 dans la Flandre orientale; 1 dans la province de Limbourg; et 1 dans la province de Namur.

On fabrique dans ces établissements des tissus unis, ouvrés, façonnés et damassés en coton, lin, chanvre, jute, laine peignée et cardée, soie, etc. . . . . purs et mélangés, tels que: cotonnettes et coutils en tous genres, étoffes pour robes, pantalons, ameublements, draps divers, châles, couvertures, piqués, velours, tapis, etc.

Les écoles et classes ménagères subsidiées par l'Etat sont au nombre de 219; ces institutions se répartissent comme suit: Anvers 15; Brabant 28; Flandre occidentale 15; Flandre orientale 41; Hainaut 46; Liège 34; Limbourg 12; Luxembourg 10; Namur 8.

L'enseignement maritime se donne dans deux écoles de Navigation de l'Etat, l'une à Anvers, l'autre à Ostende; l'enseignement y est gratuit. Les leçons se donnent du 1<sup>er</sup> septembre au 31 juillet, les dimanches et fêtes exceptés. L'enseignement comprend les matières suivantes: arithmétique, géométrie, trigonométrie, astronomie nautique, navigation, grément, arrimage, manœuvres, machines à vapeur marines, etc.; le commerce appliqué à la navigation marchande; observations météorologiques à la mer, d'après le système adopté par la conférence maritime tenue à Bruxelles en 1853; connaissance de la langue anglaise; rédaction des actes de l'état civil à bord d'un navire à la mer, etc.

Indépendamment de concours annuels entre les élèves de chaque école, des examens ont lieu pour les personnes qui se destinent à la navigation. Les examens sont confiés à un jury spécial pour chaque école, et composé de trois membres y compris le président.

Les concurrents qui satisfont aux conditions des programmes établis à cet effet, et qui ont le nombre requis d'années de navigation, obtiennent un certificat de capacité pour le grade de capitaine, de premier ou de second lieutenant au long cours, de capitaine ou de lieutenant au cabotage, et de patron-pêcheur.

Il existe un cours élémentaire de navigation à Nieuport pour les pêcheurs.

Les écoles de navigation d'Anvers et d'Ostende comprennent un cours spécial de machines à vapeur marines, donné par des fonctionnaires du service des constructions maritimes et placé sous la surveillance des conseils d'administration des deux écoles. Un jury spécial se réunit périodiquement, sous la présidence de M. l'ingénieur Lecointe, à Anvers et à Ostende à l'effet de procéder à l'examen des candidats qui désirent obtenir le diplôme de mécanicien de bateau à vapeur institué par l'arrêté royal du 12 novembre, 1888.

Les Athénées royaux donnent une importance très grande à l'enseignement du dessin, mais il est à regretter, avec M. Louis de Taye, inspecteur de l'enseignement des arts du dessin, que l'enseignement supérieur et moyen ne comprenne pas l'étude sommaire de l'esthétique, car l'enseignement de la philosophie du beau, comme celui des principes de l'économie politique et sociale, devrait être organisé partout et surtout dans les établissements qui ont pour mission d'enseigner l'art industriel et la science commerciale, la véritable éducation technique de tous ceux qui veulent parvenir par le travail.

Dans une brochure de M. E. Rombaut (La Belgique industrielle—Enseignement industriel et professionnel), une définition nette et précise, mais trop catégorique, est donnée de la mission de ces écoles :—"l'Enseignement industriel, dit-il, ne s'occupe que de la propagation de la "science," mais il ne faut voir dans ce mot science que l'application directe et élémentaire des connaissances nécessaires aux diverses industries." Je pense avec M. de Taye que la science et l'art doivent marcher de front pour créer des artisans habiles, des commis instruits et des contremaîtres intelligents.

Sans aucun doute le Congrès étudiera la question d'organisation des écoles industrielles et des écoles professionnelles. Il est à désirer qu'il formule un programme complet d'enseignement technique.

Des hommes d'initiative ont institué en Belgique, dans les grands centres industriels du pays, des cours destinés à relever le niveau intellectuel et l'éducation technique de nos travailleurs. L'enseignement industriel donné dans ces conférences est confié à des professeurs de talent et leurs cours sont entièrement gratuits.

Le programme du Congrès ayant exclu de ses travaux l'enseignement primaire, je crois ne pas devoir aborder les multiples questions

se rattachant à la matière; je me permettrai toutefois d'exprimer le vœu que l'enseignement du dessin commence dès l'école primaire.

Le Comte Adrien d'Oultrement dans son rapport sur les écoles professionnelles présenté à la troisième section de la commission du travail instituée par arrêté royal du 15 avril 1886, exprimait avec raison cette opinion que le dessin est indispensable à l'ouvrier; le dessin, cette écriture de l'industrie, disait M. Duruy, qui "donne de l'exactitude au coup-d'œil de l'enfant, de la souplesse et de l'habileté à sa main, en même temps qu'il forme son goût et développe en lui le sentiment du beau."

M. d'Oultrement ajoutait dans ce rapport où il parle de l'œuvre des écoles professionnelles qui s'est fondée en Belgique à la fin de 1885 :—"L'étude du dessin en général doit être considérée comme faisant partie essentielle de l'enseignement primaire, mais aussitôt que l'apprenti est initié aux notions générales, il faut qu'il apprenne à appliquer les connaissances du dessin à la branche d'industrie à laquelle il doit appliquer son talent et consacrer sa vie."

Rien ne peut mieux aider à développer les connaissances techniques si nécessaires à ceux auxquels sont confiés les progrès de l'industrie privée : ouvriers, contremaîtres, chefs d'industrie.

En résumé, on ne peut trop faire de sacrifices pour donner à l'ouvrier l'enseignement professionnel, au contremaître l'enseignement industriel, au chef d'industrie l'instruction supérieure.

## V.

### ENSEIGNEMENT COMMERCIAL.

L'un des plus grands établissements d'instruction commerciale du monde est l'*Institut Supérieur de Commerce d'Anvers*.

C'est à M. A. Dechamps, Ministre des Affaires Etrangères que revient l'honneur d'avoir, en 1847, sur la proposition de M. H. Matheysen, saisi le conseil communal et le conseil provincial siégeant en cette ville d'un projet de créer dans notre métropole commerciale "une Université belge du Commerce et de l'Industrie."

Les universitaires et le monde officiel ne purent admettre qu'on voulût placer sur la même ligne l'enseignement commercial et les humanités. Le titre d'Institut remplaça donc celui d'Université et la création de l'école fut l'objet non d'une loi mais d'un simple arrêté ministériel ce qui plaçait l'Institut dans une

situation inférieure aux écoles normales, aux universités, aux athénées, et aux écoles moyennes du royaume et devait couper court pour longtemps à son essor.

L'idée de fonder une école de commerce était abandonnée quand en 1852 M. Rogier, Ministre de l'Intérieur, fixa les bases de l'organisation de la nouvelle école et les soumit au conseil communal qui s'empessa de voter à l'unanimité l'arrêté qui autorisait la ville à ratifier la proposition du ministre.

Quelques jours après un arrêté, contresigné du roi, créait l'Institut qui ouvrait ses portes en 1853 avec cinquante-et-un élèves dont dix réguliers et quarante-et-un spéciaux.

Quatorze ans après sa fondation, en 1897, l'Institut ne comptait encore que soixante-six élèves dont trente-cinq étrangers, ce qui montre que sa réputation, très méritée déjà était mieux établie au delà de nos frontières qu'en Belgique même.

C'est seulement depuis que le titre de "Licencié en sciences commerciales" a été conféré, en 1876, aux élèves de l'Institut qui, ayant terminé leurs études et subi les examens prescrits, obtiennent un diplôme de capacité et lorsque M. Grandgagnage a été appelé à diriger cet important établissement que le nombre des élèves réguliers s'est élevé d'année en année.

L'abaissement du prix d'inscription au rôle de l'Institut ainsi que les dispositions prises par l'Etat en faveur du diplôme, assimilé à la licence, et placé dans la loi électorale de 1883 sur le pied d'égalité avec les diplômes universitaires et l'arrêté royal du 16 octobre, 1878, créant des bourses d'étude en faveur de l'enseignement commercial et des bourses de voyage en faveur des licenciés en sciences commerciales, a aussi fortement contribué au succès de cet établissement modèle.

Années.	Total.	Belges	Etran- gers.	Régu- liers.	Spé- ciaux.
1853 à 1857	316	226	90	124	192
1858 „ 1862	348	157	191	206	142
1863 „ 1867	358	164	194	183	175
1868 „ 1872	571	342	229	221	350
1873 „ 1877	666	372	294	247	419
1878 „ 1882	637	410	227	276	361
1883 „ 1887	683	402	281	408	275
1888 „ 1892	945	539	406	628	317
1893 „ 1896	906	569	337	636	250
	5,430	3,181	2,249	2,949	2,481

Le nombre des élèves belges et des élèves réguliers, c'est-à-dire suivant tous les cours et soumis à des examens permanents et aux examens de fin d'année, va grandissant de période en période quinquennale comme vous le verrez dans le tableau suivant :—

Quoique le nombre des élèves réguliers soit de 2,949, il n'a encore été délivré que 638 diplômes de capacité.

Ce nombre très restreint d'élèves réguliers parvenant à obtenir le diplôme de licencié en sciences commerciales a pour cause le manque de préparation aux études commerciales, le manque d'assiduité aux cours et pour le plus grand nombre, dans l'examen oral, des difficultés d'élocution.

L'Institut a pour but exclusif l'enseignement des sciences commerciales théoriques et appliquées.

L'enseignement complet s'était donné jusqu'en 1897 en deux ans et l'emploi du temps par semaine était ainsi divisé :—

Facultés.	Première année.	Seconde année.
Bureau commercial.....	12	12
Arithmétique commerciale ....	3	3
Histoire des produits commer- ciaux et chimie commerciale...	2	3
Economie politique et statistique	1	2
Histoire générale du commerce..	2	..
Géographie commerciale et indus- trielle.....	1	3
Droit commercial et maritime.		
Principes du droit des gens ..	2	..
Principes généraux du droit ....	..	1
Législation douanière.....	1	..
Construction et armements mari- times .....	..	1
Néerlandais .....	2	2
Allemand .....	3	3
Anglais .....	3	3
Espagnol ou Italien.....	3	3
Russe .....	..	3
Total des heures par semaine..	35	39

Le bureau commercial qui figure pour 12 heures par semaine dans le tableau ci-dessus est annexé à l'Institut pour traiter fictivement les affaires de commerce et de banque d'une manière pratique; les exercices pratiques de commerce et d'industrie simulés comportent également deux années d'étude.

Voici l'ordre des matières du programme de l'Institut pour le bureau de première année :

A. Arithmétique commerciale. Répétition des opérations fondamentales, fractions ordinaires et décimales, parties aliquotes, proportions, explication des règles d'intérêt, d'escompte, de sociétés, de mélange, d'alliage,

etc. Echéance moyenne. Comptes courants et d'intérêts (méthode directe, indirecte et hambourgeoise). Comptes de revient. Changes. Fonds publics, matières d'or et d'argent. Négociations, arbitrages en ces valeurs diverses.

B. Opérations simulées d'une maison de commerce traitant toute espèce d'affaires (la banque, les marchandises, les armements), pour propre compte, en commission, en participation. Applications des calculs commerciaux et de la comptabilité, factures, comptes d'achat et de vente, comptes de frais, comptes courants, comptes de revient de marchandises, etc. Opérations en changes, arbitrages, fonds publics. Inscription de chaque opération dans les livres régulièrement et pratiquement tenus en partie double. Lettres de change, effets à créer, à endosser, contrat d'association, lettre de voiture, connaissements, charte-parties, lettres à la grosse, warrants, contrats d'assurance, comptes de recouvrements et avaries particulières, règlements d'avaries grosses, etc. Usages de la place d'Anvers et des principales places étrangères, comparaison de poids, mesures, etc.

Correspondance en français, en néerlandais, en anglais et en allemand, ayant pour objet des ordres donnés ou reçus, l'achat et la vente de marchandises, la consignation de navires et leur chargement.

Bilan et liquidation de la maison à la fin de l'année.

Les élèves sont d'abord exercés à la pratique du calcul des factures, des bordereaux de banque et de bourse, des comptes courants et de revient, des changes, des arbitrages, etc.; ainsi qu'à la confection des lettres de change, des connaissements, charte-parties, lettres de voiture, etc. Chaque document commercial placé sous les yeux de l'élève est l'objet d'explications ou de renvois aux explications des cours théoriques.

Ensuite on aborde les opérations régulières d'une maison de commerce, la même pour tous les élèves et dans laquelle chacun d'eux doit remplir toutes les fonctions, tenir tous les livres et faire la correspondance relative aux opérations de la maison, en français d'abord et pendant les derniers mois de l'année, dans les diverses langues. Les opérations de ce commerce fictif sont dictées à l'élève en tenant compte des fluctuations des cours sur les divers marchés.

Chaque mois on fait la balance des opérations, et le 31 mai l'inventaire et l'ouverture des livres à nouveau sont dressés de manière

que l'élève embrasse tout l'ensemble des opérations et des écritures.

Dans cette première année les affaires sont limitées à l'Europe, mais comprennent les affaires de commission et de banque, pour compte propre, en participation ou pour compte d'autrui; les consignations et les affrètements, les expéditions.

Les comptabilités industrielles ou de sociétés sont appliquées dans les points où elles diffèrent de la comptabilité commerciale ou de banque.

Dans le bureau de deuxième année, le plan change: l'élève exercé précédemment à traiter dans leur ordre de dates les opérations pouvant se liquider rapidement avec l'Europe, est maintenant exercé à suivre les opérations de longue haleine, depuis la transmission de l'ordre jusqu'à l'exécution parfaite, en passant par toutes les phases intermédiaires, pour aboutir à la vente sous voile ou sur un marché quelconque, tous calculs faits, toute correspondance en règle, toutes écritures passées dans l'ordre des combinaisons et du temps.

La marche générale de l'opération est seulement indiquée à l'élève, avec les conditions spéciales; c'est à lui de l'exécuter, au mieux de ses intérêts sous l'œil du professeur.

Ces opérations fictives, calquées sur des opérations réelles puisées dans la pratique des grandes maisons, sont poursuivies avec les principales places de commerce du monde. L'élève les suit aisément et avec intérêt car elles sont peu nombreuses.

Il en établit les divers comptes dans les poids, mesures et monnaies des divers pays; il fait la correspondance dans les diverses langues.

On trouve dans ces exercices pratiques un excellent thème des connaissances acquises au bureau de première année ainsi que dans les différents cours théoriques.

Cette méthode est évidemment propre à former des négociants capables de comprendre l'ensemble des affaires, de les combiner et de les exécuter dans toutes leurs parties.

Rappelons que de prime abord l'Institut d'Anvers avait appliqué le système des sections ou maisons de commerce par lesquelles les élèves passaient successivement.

Importé à Mulhouse par M. le docteur Penot, ce système qui présente certains avantages, n'a pas réussi à l'école de Lyon. Il est encore en usage aux écoles de Marseille, de Bordeaux et du Havre.

Les raisons qui l'ont fait rejeter à l'Institut d'Anvers sont, dit Mons. Leautey—

1. Que les élèves ne faisaient ainsi qu'une partie du travail;

2. Que les opérations étaient limitées avec quelques places parce qu'il était impossible de modifier continuellement les sections ;

3. Que les élèves occupaient l'un vis-à-vis de l'autre des positions inférieures qui n'étaient pas toujours acceptées avec plaisir ;

4. Qu'il fallait, pour appliquer parfaitement ce système, ou des chefs de bureau assez nombreux pour surveiller de près les opérations de chaque comptoir, ou des élèves moniteurs censément placés à la tête de ces comptoirs et capables d'exécuter les données du chef de bureau.

On a donc jugé préférable de faire exécuter par chaque élève toutes les parties des opérations en se transportant fictivement dans les places où se passe chacune d'elles.

On est ainsi revenu à la méthode suivie dès 1820 à l'Ecole supérieure de commerce de Paris, qui, d'ailleurs, essaya, elle aussi, sous la direction de Blanqui, du sectionnement du bureau commercial par maisons de commerce et qui y renonça au bout de quelques années.

Voici l'ordre des matières du programme actuel de l'Institut pour le bureau commercial de deuxième année :

Complément de l'étude des conditions de vente et d'achat et des usages en général des places de commerce des diverses parties du monde.

Affaires d'importation, d'exportation, de transit, de commission, d'armement, d'assurance, de banque, etc. Application des calculs aux arbitrages.

Livres à tenir, comptes à faire, opérations de bourse, renseignements à recevoir ou à donner, contrats à terme.

Application à des questions pratiques des notions théoriques acquises dans tous les autres cours.

Questions contentieuses, opérations pratiques et comptabilité.

Rapports commerciaux, économiques, financiers et industriels à faire sur divers pays.

Correspondance en français, en néerlandais, en anglais, en allemand, en espagnol, en italien et en russe.

Avis commerciaux.—Outre les renseignements de la bourse d'Anvers, le Bureau commercial de l'Institut reçoit des avis réguliers de commerce de Londres, Liverpool, New York, La Havane, Rio-de-Janeiro, Buenos-Ayres, Valparaiso, Sydney, des Indes, de la Chine, d'Odessa, Hambourg, Amsterdam, du Havre, etc.

Tous ces renseignements en langue originale sont communiqués aux élèves.

Arithmétique commerciale. Questions d'intérêts composés, de placements annuels, d'annuités ; applications nombreuses aux questions d'emprunts, d'amortissements, de rentes viagères, etc. ; crédits fonciers, obligations, emprunts à prime, assurances ; principes pour le calcul des primes ; assurances maritimes contre l'incendie et sur la vie ; tables de mortalité, assurances dotales, tontines, chemins de fer, tarifs, dépenses de l'unité de trafic, etc.

Un cours préparatoire comprenant les matières de l'examen d'admission au cours de première année existe à l'Institut ; cette école spéciale, annexe, est ouverte de Pâques au 10 août ; elle a été créée surtout pour faciliter l'examen d'entrée des étrangers.

Le minimum d'âge d'admission est seize ans six mois.

Le programme du cours préparatoire et de l'examen d'admission en première année comprend :

I.—Cours de langues (langue française, langue allemande, langue anglaise).

II.—Tenue des livres.

III.—Géographie.

IV.—Mathématiques.

V.—Notions élémentaires de physique et de chimie.

VI.—Histoire universelle.

VII.—Droit commercial.

VIII.—Economie politique.

Les examens d'admission ont lieu par écrit et oralement sur les matières énoncées ci-dessus.

La partie théorique du cours de première année comprend ce qui suit :

I.—Histoire des produits commerciaux ; cours donné sur les échantillons du musée annexé à l'Institut (produits du règne minéral et du règne végétal).

II.—Géographie commerciale et industrielle.

III.—Principes généraux de droit.

IV.—Economie politique.

V.—Allemand.

VI.—Anglais.

VII.—Néerlandais.

VIII.—Espagnol ou Italien.

La partie théorique comprend pour la deuxième année les cours suivants :

I.—Histoire des produits commerciaux et chimie commerciale (produits du règne végétal, suite, produits tirés du règne animal, et produits fabriqués). Les élèves sont initiés aux opérations de chimie commerciale dans un laboratoire annexé à l'établissement.

II.—Histoire générale du commerce et de l'industrie.

III.—Géographie commerciale et industrielle.

IV.—Droit commercial et maritime. Principes du droit des gens.

V.—Législation douanière.

VI.—Construction et armements maritimes.

VII.—Economie politique.

VIII.—Allemand.

IX.—Anglais.

X.—Néerlandais.

XI.—Espagnol ou Italien.

XII.—Russe.

#### VI.

Le Comité central de la Chambre de Commerce d'Anvers avait, sur la proposition de M. Alexandre Frank, soumis la question de l'enseignement commercial à une commission, présidée par M. Louis Strauss, président du conseil supérieur du Commerce et de l'Industrie et président du cercle des anciens étudiants de l'Institut Supérieur de Commerce d'Anvers.

Cette commission, composée de MM. A. Bulcke, F. Déjardin, A. Frank, et L. Van Peborgh, a nommé M. A. Frank son secrétaire rapporteur.

Ce rapport affirme que le commerce est devenue une science exacte dont la connaissance exige des études multiples, embrassant à la fois la production, la consommation, l'industrie et ses transformations, la statistique, la situation économique et financière ainsi que les événements et les éléments de nature à les modifier, la question du crédit, le droit commercial et tant d'autres auxiliaires indispensables aux affaires, tels que les banques, les assurances, les armements, les affrètements, le transport, la commission, etc.

Cet intéressant rapport, qui semble avoir été préparé pour le Congrès International de l'Enseignement Technique et que vous trouverez ci-joint dans le numéro du 13 mai de la "Revue Economique," demande l'organisation de l'enseignement commercial graduel et méthodique. Celui-ci doit avoir la place importante qui lui revient et qui donnera au commerçant belge dans la vie sociale, le rang qu'il occupe dans les pays anglo-saxons.

Le rapport, en traitant de l'enseignement supérieur, demande la subdivision des hautes écoles en deux degrés ; le premier comprenant les deux années d'étude conduisant au titre de "Licencié en Sciences Commerciales ;" le second donnant, après une troisième année d'étude, l'occasion d'acquérir le titre de "Docteur en Sciences Commerciales," qui leur permettrait de se vouer aux carrières diplomatiques et consulaires.

Les élèves de l'Institut d'Anvers ont l'usage d'une bibliothèque où se trouvent tous les ouvrages, les journaux et les publications se rapportant aux sciences commerciales et économiques, aux rapports consulaires des différents pays, aux voyages, etc.

La ville d'Anvers a organisé un Musée Commercial à l'instar de celui de Bruxelles établi dans la capitale sous la direction de l'administration centrale du Département des Affaires Etrangères.

Le Ministre qui dirige notre Foreign Office est, en Belgique, aussi notre Ministre du Commerce.

Le musée commercial de Bruxelles qui est ouvert tous les jours au public a pour but de renseigner nos travailleurs sur la marche des affaires dans les pays étrangers et de leur faciliter en même temps les transactions commerciales avec les consommateurs et les producteurs de ces contrées ; il prend, dans le domaine des sciences commerciales, la place qu'occupent dans le domaine des sciences naturelles les collections minéralogiques, géologiques, et anatomiques. C'est en quelque sorte un complément de l'enseignement technique commercial, car à côté des produits, le visiteur trouve dans la bibliothèque du musée non-seulement des traités techniques se rapportant aux principales industries mais toutes les publications du monde traitant des questions industrielles, économiques, financières et commerciales.

Des conférences et des visites dans les principales usines du pays sont organisées par les soins de l'administration de l'Institut Supérieur et complètent son enseignement.

Toutes ces questions d'enseignement supérieur commercial ont été résolues à la direction de l'enseignement supérieur des sciences et des lettres par MM. de Favereau et Schollaert, Ministres des Affaires Etrangères et de l'Intérieur conjointement avec leurs collègues de l'Agriculture et de l'Industrie, MM. de Bruyn et Nyssens.

C'est à Son Excellence le Baron de Favereau que revient l'honneur d'avoir assuré l'organisation définitive de l'enseignement commercial supérieur en Belgique en contresignant l'arrêté royal du 13 février 1897.

Désormais, pour obtenir le titre de vice-consul de carrière, il est nécessaire, indépendamment des conditions exigées de tout belge pour devenir fonctionnaire, de produire certaines preuves d'aptitude. Ces preuves peuvent résulter de la possession du diplôme de licencié du degré supérieur en sciences commerciales

et consulaires délivré, dans certaines conditions, par les Universités belges ou par l'Institut d'Anvers.

Voilà donc l'enseignement supérieur des sciences commerciales et consulaires en vigueur non-seulement à l'Institut d'Anvers, mais dans les Universités du Royaume, à l'Ecole militaire, à l'Institut Agricole de Gembloux et à l'Ecole provinciale des mines du Hainaut.

Vous trouverez, en annexe, le programme officiel des cours de troisième année de l'Institut Supérieur de Commerce d'Anvers inauguré récemment.

“ L'Article I. de l'arrêté du 13 janvier 1897, réglant les examens consulaires stipule, dit M. de Ramaix, rapporteur du budget des Affaires Etrangères dans son rapport fait au nom de la section centrale à la Chambre des Représentants de Belgique, ‘ que les porteurs de diplômes de licencié du degré supérieur en sciences commerciales et consulaires délivrés soit par l'Institut Supérieur de Commerce d'Anvers, soit par les Universités, pourront seuls être admis aux fonctions consulaires sans avoir à subir d'examen nouveau.’

Il nous a paru intéressant de nous informer de l'accueil réservé à ces dispositions par notre jeunesse universitaire et notamment de rechercher si le nouveau cours créé dans ce but, en novembre dernier, à l'Institut d'Anvers, était fréquenté.

Naturellement les renseignements nous manquent au sujet des Universités, puisque l'arrêté n'a pas encore pu être appliqué ; mais nous savons que quinze élèves, y compris deux étrangers, suivent en ce moment, à Anvers, le cours en question.

Le programme de cette troisième année d'études imposé aux licenciés en sciences commerciales qui se destinent à la carrière consulaire et la haute valeur des professeurs préposés à cet enseignement permettent d'espérer dans l'avenir, plus encore que par le passé, que le Gouvernement trouvera parmi les élèves de l'Institut Supérieur de Commerce une pépinière de jeunes gens à la hauteur de leurs fonctions et à même de rendre d'utiles et de réels services au pays.

Il ne sera pas hors de propos de rappeler que ce même Institut a déjà fourni au corps consulaire belge trente membres dont plusieurs comptent parmi nos meilleurs agents et dont quelques-uns ont acquis, dans le pays et à l'étranger, des situations absolument prépondérantes. D'autre part, soixante-huit de ces anciens élèves ont obtenu des bourses de voyage conférées par le Gouvernement.

Tout nous permet donc d'espérer de l'organisation nouvelle des résultats sérieux et favorables au recrutement des jeunes consuls.”

Le Ministère des Affaires Etrangères de Belgique a lieu de se féliciter des innovations sérieuses qu'il vient d'introduire dans sa représentation consulaire et au concours qu'il a apporté à l'organisation de l'enseignement commercial supérieur, enseignement qui relèvera le prestige de la carrière commerciale.

Les sections professionnelles de nos athénées et quelques institutions privées, laïques ou religieuses, seules, donnent de l'importance à l'enseignement commercial et économique.

Maintenant que nous possédons une université commerciale, nous ne tarderons pas à suivre, en Belgique, l'exemple de la Chambre de Commerce de Londres et nous ouvrirons, dans nos établissements d'enseignement primaire et moyen, des cours qui feront comprendre l'importance capitale de l'instruction commerciale surtout dans les pays de production industrielle.

## VII.

### ENSEIGNEMENT PRIMAIRE ET MOYEN.— RÉSUMÉ.

Les renseignements qui précèdent doivent être complétés par un résumé concernant l'enseignement primaire et moyen.

#### *A.—Enseignement Technique.*

Les écoles techniques inférieures belges sont divisées en deux types différents :

1. Ecoles industrielles.
2. Ecoles professionnelles.

Dans les premières on ne donne que des cours du soir et du dimanche et les élèves sont des ouvriers ou employés occupés à l'atelier pendant le jour.

Dans les secondes les élèves sont tenus à l'école tout le jour et y travaillent manuellement.

A un autre point de vue il existe des écoles communales et des écoles libres.

Les premières sont administrées par une commission où les délégués de la commune forment la majorité.

Dans les secondes, la commune est simplement représentée par un ou plusieurs délégués pour contrôle de l'emploi des subsides accordés, et l'administration de l'école appartient à des délégués des métiers ou syndicats qui l'ont créée.

L'Etat, la province, la commune, et des particuliers interviennent dans les dépenses.

L'Etat accorde généralement un tiers de la



dépense, déduction faite du loyer et du minerval, aux écoles industrielles et deux tiers aux écoles professionnelles qui coûtent beaucoup plus cher.

Charleroi, Liège, Morlanvelz, etc.—ont des écoles industrielles pures.

Bruxelles fait exception momentanément au point de vue des subsides parce que l'Etat l'a chargée de deux services anciens du Musée Royal de l'Industrie supprimé en 1886.

Les Ecoles d'horlogerie, des tailleurs sont des écoles professionnelles libres pures.

L'Ecole Nicaise (mécanique) à Gand est une école professionnelle communale pure.

Tournai, anciennement école des arts et métiers est une école communale à la fois professionnelle et industrielle. Les élèves sont envoyés dans un atelier particulier où ils travaillent sous la surveillance de contremaîtres placés par la commune.

Les programmes d'études sont excessivement variables d'un point à un autre du pays, mais tous ont une base commune.

On enseigne à tous les élèves pendant les premières années, dans toutes les écoles, le dessin, les mathématiques, la géométrie, les éléments de physique et de mécanique, l'hygiène et l'économie industrielle.

Chaque école a des cours d'application appropriés à l'industrie de la localité et là encore le dessin marche de pair avec la technologie.

Exemple :—Charleroi a la métallurgie ;

Morlanvelz, l'exploitation des mines ;

Soignies, la coupe des pierres ;

Ostende, la pêche ;

Anvers, les constructions navales ;

Gand, le tissage ;

Bassenge, le tressage de la paille ;

et ainsi de suite.

Le Gouvernement belge subsidie aussi une cinquantaine d'écoles qui renferment plus de trente mille élèves, et la dépense totale de ces écoles, non compris les frais de premier établissement, s'élève à une cinquantaine de francs par élève.

Je terminerai ce résumé en mettant sous vos yeux le texte des conclusions adoptées par la commission du travail instituée par arrêté royal du 15 avril, 1886, dans sa séance plénière du 5 février, 1887, M. le Comte d'Oultremont remplissant les fonctions de rapporteur.

#### I.

Il y a lieu, pour les pouvoirs publics, d'encourager la création d'écoles profession-

nelles en annexant aux académies et aux écoles industrielles des cours d'art et de science appliqués à l'industrie.

Cet enseignement devrait avoir une direction pratique.

L'initiative privée qui s'affirme par la création d'écoles professionnelles et d'apprentissage pourrait être encouragée par les pouvoirs publics si au surplus, ces écoles répondent à toutes les conditions de publicité et d'inspection.

#### II.

La culture de l'habileté manuelle doit commencer à l'école primaire.

Les applications théoriques des sciences à l'industrie s'enseignent à l'école industrielle.

Les applications théoriques des arts graphiques et plastiques à l'industrie s'enseignent dans les écoles d'art décoratif.

L'apprentissage se fait dans les ateliers ou dans des écoles fondées par des patrons ou des syndicats professionnels et intimement unies à des ateliers.

#### III.

L'action de l'Etat doit se borner à établir une harmonie et une gradation entre ces diverses écoles d'enseignement professionnel, à les encourager par des subsides tout en respectant, le plus possible, l'initiative propre des groupes qui les ont fondées.

#### IV.

Les communes pourront prêter leur concours à l'enseignement professionnel par

1. L'introduction d'exercices manuels dans les écoles primaires ;

2. La fondation d'écoles industrielles et d'écoles de dessin et de modelage ;

3. Des encouragements consistant en subsides par l'octroi des locaux aux syndicats professionnels.

#### V.

L'Etat et les communes devraient subordonner leur concours aux conditions suivantes :

1. Un minimum d'âge pour l'admission à l'école d'apprentissage ;

2. Un minimum de connaissances, justifié par un examen, pour l'admission des apprentis.

Ce minimum pourrait être une connaissance complète de la lecture, de l'écriture et des quatre règles fondamentales de l'arithmétique.

#### VI.

Le Gouvernement devrait favoriser la création de cours supérieurs d'adultes dans lesquels serait donné un enseignement théorique appro-

prié aux besoins des ouvriers dans la grande industrie.

### VII.

Le Gouvernement est invité à étendre, aux enfants d'ouvriers fréquentant une école technique, le tarif des abonnements ouvriers au chemin de fer.

La collectivité des écoles industrielles, professionnelles et commerciales de Belgique expose, à l'exhibition internationale de Bruxelles, près de la section britannique, une très intéressante collection de produits qui permet de constater les résultats de notre enseignement technique et commercial.

La commission organisatrice de ce compartiment est composée d'un président, M. Rombaut, délégué du Gouvernement belge au Congrès et de deux secrétaires : M. Wauters, inspecteur - adjoint qui accompagnera M. Rombaut au Congrès de l'Enseignement technique de Londres, et M. William de Fontaine, architecte de talent et professeur à l'école industrielle de Bruxelles.

Parmi les nombreuses institutions qui sortiront du World's Fair qui restera ouvert jusqu'au mois de novembre, 1897, à Bruxelles, M. le Ministre Nyssens, répondant à M. de Mot, président du comité exécutif, a déclaré que le Musée Colonial n'était pas le seul monument qui marquerait le souvenir de l'exposition, mais que la commission du "Palais du Peuple" allait voir ses travaux couronnés de succès par l'installation d'un musée scientifique essentiellement populaire dont l'ouvrier pourra retirer, outre un enseignement général, une utilité pratique.

Le Musée d'Economie Sociale sera un instrument puissant d'étude pour nos ouvriers, contremaîtres et tous les coopérateurs de notre activité économique.

### B.—Enseignement Commercial.

Il m'est pénible de devoir constater que jusqu'à ce jour l'enseignement commercial primaire et moyen et les écoles de commerce ont fait peu de progrès en Belgique.

Le programme type des écoles primaires communales du 1<sup>er</sup> mai 1897, en fait à peine mention, au moins pour les branches dont la loi déclare l'enseignement obligatoire. Cela est d'autant plus regrettable que c'est parmi les ouvriers que se fait le recrutement des membres des conseils d'administration des sociétés coopératives, des caisses d'épargne, des sociétés de secours mutuels, des caisses de secours, de prévoyance et de retraite et une partie des

membres des conseils d'industrie et du travail, des conseils de prud'hommes, enfin de toutes les associations auxquelles s'associent les travailleurs.

On donne dans nos écoles des notions d'hygiène, d'histoire, d'agriculture; les notions élémentaires des sciences naturelles sont reléguées dans les branches facultatives; il n'est pas même fait mention de l'économie politique et sociale! et cependant le commerce unit les différentes classes de la société; il est le lien de toutes les activités, de toutes les industries, de tous les peuples.

Une nation de producteurs doit encourager par tous les moyens possibles l'étude des sciences commerciales et économiques à tous les degrés: inférieur, moyen et supérieur.

C'est à son admirable organisation de l'enseignement technique et commercial autant qu'à sa fidélité aux principes de liberté commerciale que l'Empire Britannique doit sa prépondérance et cette prospérité inouïe qui est constatée dans toutes les branches du travail à l'occasion du jubilé de Sa Très Gracieuse Majesté La Reine Victoria.

### C.—Congrès International de l'Enseignement Commercial d'Anvers, 1898.

L'année prochaine le cercle des Anciens Etudiants de l'Institut Supérieur de Commerce d'Anvers fêtera le XXV<sup>e</sup> anniversaire de sa fondation par l'organisation d'un Congrès International de l'Enseignement Commercial qui se tiendra à Anvers pendant les vacances de Pâques.

Le Congrès International de l'Enseignement Technique qui s'ouvrira à Londres le 15 juin prochain et pour lequel j'ai écrit le présent rapport sera heureux d'apprendre cette bonne nouvelle, car il permettra à tous ceux qui prennent à cœur la cause civilisatrice de l'enseignement de se réunir de nouveau, à bref délai, dans la Métropole Commerciale de la Belgique.

## RAPPORT SUR L'ENSEIGNEMENT TECHNIQUE EN BELGIQUE,

PAR PAUL WAUTERS,

Inspecteur-Adjoint de l'Enseignement Industriel et Professionnel, délégué du Gouvernement Belge.

M. Rombaut, Inspecteur-Général de l'Enseignement industriel et professionnel, avait été délégué avec M. le Professeur Pyfferoen,

ici présent, et moi, pour représenter officiellement le Gouvernement belge au Congrès international de l'Enseignement technique organisé à Londres par votre importante Société.

M. Rombaut avait l'intention de prononcer un discours pour faire l'historique et vous donner le détail de l'enseignement technique tel qu'il est organisé en Belgique. Une indisposition l'ayant empêché au dernier moment de partir pour l'Angleterre, je me trouve appelé à l'honneur enviable mais périlleux, de le remplacer. L'important auditoire devant lequel j'ai l'avantage de me présenter perdra certainement au change ; je ne suis pas orateur, et ayant été pris au dépourvu, je me vois forcé de réclamer toute sa bienveillante indulgence.

Je me bornerai à présenter un résumé sommaire de la question et je serai trop heureux de pouvoir fournir, ensuite, des renseignements complémentaires à toutes les personnes qui voudraient bien en demander.

L'enseignement technique dépend en Belgique du Ministère de l'Industrie et du Travail. Monsieur le Ministre Nyssens qui dirige ce Département depuis plus de deux ans avec une autorité reconnue par tous les partis, pénétré de ce qu'un des principaux moyens de faire progresser l'industrie, est de relever la valeur intellectuelle et morale de ceux qui la pratiquent, a donné une impulsion nouvelle à cette question, si importante pour la prospérité du pays et le relèvement du travailleur. Il favorise, par tous les moyens en son pouvoir, la création d'institutions nouvelles et le développement de celles qui existent déjà. Le Gouvernement accorde aux écoles son concours financier, mais en retour il se réserve le droit d'approbation des règlements, des programmes et des horaires des cours, des budgets, ainsi que des nominations des membres des Commissions administratives et du personnel enseignant. Un service d'inspection, dirigé depuis de longues années par M. l'Inspecteur-Général Rombaut, a pour mission de contrôler la marche des écoles et d'aider à leur perfectionnement.

Je vais me permettre, si vous le voulez bien, de donner un rapide aperçu des divers genres d'établissements d'instruction subsideés en Belgique par le Ministère de l'Industrie et du Travail. Je les ai divisés de la manière suivante :

I.—Enseignement ménager pour jeunes filles ;

II.—Enseignement professionnel pour jeunes filles ;

III.—Ateliers d'apprentissage pour jeunes filles et pour garçons ;

IV.—Enseignement professionnel pour garçons ;

V.—Enseignement industriel pour garçons ;

VI.—Ecoles spéciales pour garçons.

#### I.—ENSEIGNEMENT MÉNAGER POUR JEUNES FILLES.

La Belgique ne comptait que deux institutions de ce genre il y a dix ans et elle en a aujourd'hui 225 dirigées par 450 maîtresses et fréquentées par 9,539 jeunes filles. Si ces écoles ont pris un tel développement, c'est parce qu'elles rendent des services inappréciables aux classes laborieuses.

On croirait peut-être à l'étranger qu'il s'agit ici de grands établissements destinés à former des demoiselles à l'esprit bien cultivé, non. L'enseignement ménager poursuit un but plus modeste : il s'adresse à la fille de l'ouvrier, il l'initie à la pratique raisonnée des travaux du ménage et lui fait acquérir les vertus domestiques qui lui seront nécessaires quand, à son tour, elle fondera une famille nouvelle.

La première école ménagère fût créée en 1872 à Couillet, la seconde en 1874 à Frameries, d'autres vinrent après, mais faute de surveillance et de programme bien défini, presque toutes se transformèrent peu à peu en écoles de couture. Leur organisation, telle qu'elle existe aujourd'hui, et leur prospérité, datent de 1889. (Circulaire Ministérielle du 26 Juin 1889.) Depuis cette époque, l'enseignement ménager est subsideé par le Gouvernement. La fondation des écoles cependant, est laissée, comme autrefois, à l'initiative privée, aux sociétés charitables et aux communes. Le but poursuivi est resté le même : donner aux jeunes filles de la classe laborieuse toutes les connaissances que doit posséder une bonne ménagère.

Les cours se font le matin, l'après-midi, le soir ou le dimanche, suivant les besoins locaux. L'enseignement est de une ou deux années, d'après l'importance des institutions et le nombre de jours de cours par semaine ; les établissements sont appelés suivant les cas : écoles ménagères ou classes ménagères. Chaque école n'a, en moyenne, qu'une vingtaine d'élèves, à l'exception de certaines institutions des centres populeux qui en comptent un nombre notablement plus grand. Le programme des écoles ménagères comprend des cours théoriques et des exercices manuels.

*A.—Les cours théoriques comportent.*

- 1°. Des notions d'hygiène,
- 2°. L'économie domestique,
- 3°. Les soins à donner aux enfants et aux malades.

*B.—Les exercices pratiques sont.*

- 1°. La cuisine et le ménage ;
- 2°. La couture, le raccommodage du linge et des vêtements et le tricotage ;
- 3°. Le lavage et le repassage du linge ;
- 4°. L'entretien des meubles et des habitations ;
- 5°. Enfin, pour les communes rurales, les travaux du jardin potager et les soins de la basse-cour.

Les élèves sont divisées en groupes ; ceux-ci s'occupent alternativement des travaux signalés et constituent, autant que cela peut se faire, un véritable ménage ouvrier, où chacune remplit à son tour les fonctions de la ménagère.

On peut juger par cet exposé succinct, du rôle social puissant que l'enseignement ménager pour jeunes filles exerce dans la société. Il forme pour l'ouvrier des ménagères intelligentes, économes, soigneuses et dévouées, des femmes capables de lui donner un intérieur heureux et agréable, et de lui faire apprécier la vie de famille qui sauve de l'alcoolisme et est une des bases de la société.

## II.—ENSEIGNEMENT PROFESSIONNEL POUR JEUNES FILLES.

Ces institutions, d'une très grande utilité, ont produit, dès leur création, d'excellents résultats.

Les unes ont été organisées par l'initiative privée, d'autres par les Communes. Le but poursuivi est de donner à la femme les connaissances générales qui lui sont nécessaires, en développant l'instruction reçue à l'école primaire, et de l'initier en même temps à la pratique d'un métier en la soustrayant à l'influence, souvent funeste, de l'atelier.

De là deux espèces de cours : des leçons générales que toutes les élèves doivent suivre et des cours spéciaux ou professionnels.

*A.—Leçons générales.*

Celles-ci comprennent, d'après les localités et l'importance de l'école, une plus ou moins grande partie des cours suivants : les langues française, flamande, anglaise et allemande, l'arithmétique, les sciences commerciales, l'histoire, la géographie, la calligraphie, les notions de sciences naturelles, de physique, de chimie, l'hygiène, l'économie domestique, la géométrie, le dessin, le chant, les connaissances

pratiques des tissus, la pédagogie maternelle, la morale, &c.

*B.—Cours spéciaux ou professionnels.*

L'enseignement professionnel comprend à un degré plus ou moins développé suivant les écoles : la confection, la lingerie, les corsets, la coupe et le dessin appliqué, le dessin industriel, le dessin d'après nature, la peinture sur porcelaine, sur soie, sur métaux, sur verre, les fleurs artificielles, les modes, la broderie, le cartonnage, les travaux domestiques, la cuisine, le lessivage, le repassage, le raccommodage, l'entretien de l'habitation et du mobilier, l'histoire du costume, etc.

Les difficultés inhérentes à la création des écoles professionnelles pour garçons n'existent pas au même degré, pour les écoles professionnelles pour jeunes filles. La nature même des métiers qui conviennent à la femme n'entraîne pas à des dépenses aussi grandes et ne nécessite pas un matériel, ni une installation aussi importants.

Cet enseignement comporte actuellement 26 écoles, 242 professeurs et maîtresses, et 2,904 élèves ; elles coûtent annuellement 370,288 francs.

Les jeunes filles, ainsi instruites, deviennent non seulement habiles au point de vue professionnel, mais l'école leur inspire aussi l'amour du travail et de l'économie et forme une pépinière de jeunes femmes, capables, grâce à leur éducation, d'obtenir plus tard dans leur ménage une influence prépondérante et d'y faire régner l'ordre, l'aisance et le bonheur.

## III.—ATELIERS D'APPRENTISSAGE POUR JEUNES FILLES ET POUR GARÇONS.

Ces établissements sont de genres assez divers, mais ils ont tous un but semblable : celui de perfectionner le jeune apprenti dans la pratique d'un métier facile qui pourra être exercé ensuite à domicile et au moyen d'outils peu coûteux.

Pour réaliser ce but, des contremaîtres instructeurs sont chargés de l'instruction professionnelle des élèves. Ils leur apprennent le métier dans tous ses détails et ses derniers perfectionnements, ils indiquent le montage et l'entretien des outils utilisés et enfin ils complètent ces leçons par des notions pratiques de la théorie des branches d'industries exercées dans l'atelier.

Pour permettre à ces jeunes ouvriers qui ont généralement reçu une instruction assez sommaire, de retirer tous les fruits désirables de cet enseignement technique, on entretient leurs

connaissances primaires, et on les complète même dans certains ateliers par des cours spéciaux, tels que le dessin, la mécanique, etc. Toutes les leçons, tant théoriques que pratiques, se donnent le jour.

Les ateliers d'apprentissage étaient, à l'origine, des établissements purement communaux, mais depuis 1841, des subsides ont été accordés par les provinces et par l'Etat. Le travail se fait, en général, pour le compte d'industriels qui fournissent la matière première. Chaque atelier est dirigé par une Commission comprenant ordinairement trois membres renouvelés périodiquement et nommés par les divers pouvoirs qui interviennent au budget.

Les ateliers d'apprentissage sont actuellement au nombre de 55 ; ils se répartissent de la manière suivante : 31 ateliers de tissage, 11 écoles professionnelles de tissage, 11 ateliers pour la taille des pierres, tous pour garçons ; 1 atelier pour le tressage de la paille et 1 atelier de coupe des vêtements et de couture pour jeunes filles. Ils comptent 60 professeurs ou contremaîtres et 1,158 apprentis.

Ces institutions ont déjà rendu d'immenses services et sont encore aujourd'hui très prospères, surtout celles pour la taille des pierres. Leur importance, en ce qui concerne le tissage, diminue dans certaines localités, par suite du développement du travail mécanique.

#### IV.—ENSEIGNEMENT PROFESSIONNEL POUR GARÇONS.

Cet enseignement comprend des écoles professionnelles, des cours professionnels, des cours commerciaux et des cours scientifiques.

L'école professionnelle et l'école industrielle poursuivent des buts distincts. Dans l'idée du Gouvernement, la première, sans négliger d'inculquer au futur ouvrier les connaissances théoriques qui peuvent lui être utiles dans l'exercice de sa profession, doit avoir surtout en vue de lui enseigner la pratique de son métier, en un mot, de former l'ouvrier. L'apprentissage à l'atelier est devenu en général défectueux et incomplet ; l'école doit y remédier en développant l'aptitude professionnelle. Elle doit donner à l'apprenti les connaissances techniques et pratiques dont il a besoin pour arriver à la perfection du travail. L'enseignement professionnel doit rendre la production meilleure en vulgarisant les procédés faciles et les méthodes les plus avantageuses. Ainsi compris, il ne peut manquer de faire augmenter la production,

de l'améliorer et par ce fait, de relever le salaire.

Les écoles professionnelles ont des origines diverses ; un grand nombre d'entre elles sont dues à l'initiative privée et à des syndicats professionnels.

Leur organisation diffère suivant les besoins locaux et le but spécial poursuivi. Les unes sont payantes, d'autres gratuites. Les cours se donnent parfois le soir et ont seulement en vue de perfectionner l'apprentissage qui se fait alors en réalité pendant le jour à l'atelier privé ; d'autres fois, les leçons ont lieu le jour et poursuivent un apprentissage complet à l'école. Pour bien faire voir l'organisation de ces établissements, il faudrait donner l'historique détaillé de chacun d'eux, ce qui n'entre pas dans le cadre de cet exposé sommaire.

Qu'il me suffise donc d'énumérer les divers genres d'écoles et de cours professionnels, subsidiés en Belgique par le Gouvernement :

1°. Des écoles professionnelles pour le travail du fer et du bois, à Gand et à Tournai ;

2°. D'horlogerie, d'électricité et de petite mécanique, à Bruxelles ;

3°. De bijoutiers et ciseleurs, à Bruxelles ;

4°. De tailleurs, à Bruxelles et à Liège ;

5°. De tapissiers-garnisseurs, à Bruxelles ;

6°. De typographes, à Bruxelles ;

7°. D'armurerie, à Liège ;

8°. De métiers divers, à Louvain et à Oostacker ;

9°. De pêche, à Ostende, à Blankenberghe et à Nieuport ;

10°. Des écoles St. Luc, qui préparent les jeunes gens par le dessin professionnel aux divers métiers d'art appliqué à l'industrie, à Gand, à Bruxelles, à Liège et à Tournai ;

11°. Des cours de dessin professionnel, à Anvers et à Herve ;

12°. Des cours de peinture professionnelle, à Audenarde ;

13°. Des cours de langues et des cours commerciaux, à Liège, à Anvers, à Bruxelles et à Gand ;

14°. Des cours publics scientifiques, à Bruxelles.

Soit un total de 23 institutions différentes, comptant 144 professeurs et 3,301 élèves, alors qu'il y a dix ans ils n'y en avait que 7 avec 33 professeurs et 459 élèves.

Comme on vient de le voir, l'enseignement professionnel pour garçons embrasse un grand nombre des métiers exercés dans le pays ; il est donc très utile, mais d'organisation coûteuse et difficile. Il prospère lentement et sûrement et plusieurs écoles nouvelles sont encore en ce

moment en formation, notamment une école professionnelle de coiffure.

#### V.—ÉCOLES INDUSTRIELLES POUR GARÇONS.

Le but recherché par le Gouvernement dans les écoles industrielles est de donner à l'ouvrier l'instruction scientifique qu'il ne peut acquérir à l'atelier, de développer son intelligence en l'initiant à la connaissance des lois générales qui président aux transformations de la matière, afin de le soustraire graduellement à la tyrannie de la routine et de lui procurer ainsi les moyens d'augmenter la valeur économique de son travail et d'améliorer, par cela même, sa condition matérielle.

Ces institutions, à une exception près, sont toutes communales. Elles sont subsidiées par les communes, par les provinces et par l'Etat.

La haute surveillance de chaque école est confiée à une Commission administrative, composée généralement du Gouverneur, du Bourgmestre et de 6 membres renouvelés périodiquement et choisis, deux par les conseils communaux, deux par la députation permanente des provinces et deux par le Gouvernement.

Les directeurs et les professeurs sont nommés et révoqués par les administrations communales sur l'avis des Commissions administratives. Ces nominations et révocations sont soumises à l'approbation du Ministre compétent.

L'instruction donnée dans les écoles industrielles est essentiellement théorique *et basée sur le dessin, dont l'enseignement marche toujours de pair avec la théorie*; plusieurs de ces institutions, cependant, ont organisé certains cours professionnels.

Toutes les leçons se donnent le soir ou le dimanche matin. L'enseignement se fait en flamand ou en français, d'après les régions. Dans certaines écoles les cours sont gratuits, dans d'autres les élèves doivent payer un droit d'inscription peu élevé. Cette mesure tend à se généraliser de plus en plus; elle donne d'excellents résultats, car on apprécie généralement mieux ce qu'on doit payer.

Les études sont divisées en trois, quatre ou cinq années, d'après les institutions. Les deux premières années sont communes et comprennent des cours généraux utiles à tous; à partir de la troisième année la division se fait et chaque élève suit un ensemble de leçons et d'exercices de dessin, en rapport avec sa profession ou ses aptitudes spéciales.

Les matières généralement enseignées dans toutes les écoles industrielles sont les suivantes :

l'arithmétique, l'algèbre, la géométrie, la physique, la mécanique, l'hygiène, l'économie industrielle, le dessin à main levée, le dessin géométrique, les projections, la perspective et le dessin professionnel.

Outre ces branches générales, un grand nombre d'écoles donnent des cours spéciaux, en rapport avec les industries de la région, tels que : l'électricité, la chimie, la métallurgie, les machines à vapeur, le chauffage, l'entretien et la conduite des machines, l'exploitation des mines, la géométrie descriptive, la coupe des pierres, la construction civile, l'architecture, la construction navale, la trigonométrie et le nivelage, la théorie de la filature et du tissage, les langues, la comptabilité industrielle et commerciale, l'histoire, la géographie commerciale, le dessin d'ornement, etc.

Enfin, certaines écoles ont organisé des cours professionnels, à savoir : le modelage, la sculpture, le tissage, la teinture, la peinture professionnelle et décorative, etc.

L'aptitude des élèves est constatée avant leur admission à l'école; ils doivent, en outre, passer un examen pour être admis d'une année d'étude à la suivante.

Des diplômes sont délivrés aux élèves qui achèvent leurs études et prouvent qu'ils possèdent les matières enseignées.

Toutes les écoles ont des collections scientifiques, des modèles industriels et des modèles de dessin qui permettent de rendre les leçons plus intuitives. Elles ont aussi une bibliothèque, des laboratoires et en général le matériel nécessaire à l'enseignement.

Les écoles industrielles sont au nombre de 40; elles comptent 466 professeurs, 13,015 élèves, et elles coûtent annuellement 657,763 francs.

L'enseignement industriel pour garçons donne d'excellents résultats et gagne encore chaque année en importance.

#### VI.—ÉCOLES SPÉCIALES POUR GARÇONS.

Les écoles spéciales pour garçons sont au nombre de six, subdivisées de la manière suivante :

1°. Une école supérieure de commerce, à Anvers;

2°. Une école provinciale d'industrie et des mines, à Mons;

3°. Une école supérieure des textiles, à Verviers;

4°. Trois écoles de brasserie, dont deux établies à Gand et une à La Louvière.

L'enseignement donné dans ces institutions s'adresse à des jeunes gens ayant reçu une instruction préliminaire assez complète; c'est

ainsi qu'il peut être d'un degré plus élevé que celui donné dans les autres écoles techniques.

1°. *L'Institut supérieur de Commerce d'Anvers* a pour but de fournir aux jeunes gens qui se destinent aux affaires commerciales et aux carrières consulaires, le complément de l'instruction commencée dans les établissements d'enseignement moyen. La pratique ne suffit pas pour faire un commerçant accompli, il faut aussi la théorie; l'école d'Anvers la donne à ses élèves et forme ainsi, tant pour le pays que pour l'étranger, des consuls, des négociants, des comptables, des employés, capables de remplir leurs fonctions avec honneur;

2°. *L'Ecole provinciale d'industrie et des mines de Mons* fut une des premières institutions créées en Belgique pour préparer aux professions industrielles. Elle ne visait au début qu'à fournir aux exploitations des mines et aux usines métallurgiques, des jeunes gens convenablement préparés, par de hautes études, à la direction de ces importantes industries. L'école s'est développée, depuis quelques années surtout, et elle forme aujourd'hui des ingénieurs aptes à diriger avec fruit tous les genres d'établissements industriels.

3°. *Ecole supérieure des Textiles à Verviers*. — Il existe depuis longtemps, à Verviers, une école professionnelle pour garçons, ayant adopté comme spécialité le tissage et tout ce qui se rapporte à cette industrie, d'un si grand intérêt local. Les cours sont simples, à la portée des ouvriers, et visent surtout à former de bons contremaîtres.

La création d'une Ecole supérieure des Textiles, annexée à l'Ecole professionnelle, fut décidée en 1891 et, grâce à la généreuse intervention des industriels, elle put s'ouvrir en 1894; elle vise surtout à la formation de bons chefs d'établissements industriels de textiles.

L'Ecole supérieure de Verviers est encore de création trop récente pour qu'on puisse juger d'une manière définitive les résultats obtenus, mais la marche favorable des études permet d'en attendre de réels services.

4°. *Ecoles de Brasserie*. — Ces écoles sont actuellement au nombre de trois; la plus ancienne est l'Institut supérieur de brasserie établi rue de Bruges, à Gand. Elle a été créée en 1887 par un Syndicat de brasseurs; la seconde est annexée depuis 1894 à l'Institut St. Liévin, à Gand, et la troisième, de création nouvelle, à l'Institut St. Joseph, à La Louvière.

Ces écoles ont pour but d'instruire les brasseurs, les fils de brasseurs, les futurs directeurs de brasserie ou les aspirants-brasseurs; elles leur apprennent à exercer leur profession dans les meilleures conditions pratiques et scientifiques. Les cours s'adressent aussi à une classe de travailleurs plus modestes, aux contremaîtres et aux ouvriers brasseurs.

L'enseignement est de deux années pour les premiers et d'une année pour les seconds; il est à la fois théorique et pratique.

Les six écoles spéciales réunies comptent actuellement 66 professeurs, 555 élèves, et coûtent annuellement 233,343 francs.

Les écoles spéciales jouissent toutes d'une légitime prospérité et rendent d'utiles services tant en Belgique qu'à l'étranger.

En résumé l'enseignement technique en Belgique, avait en 1886: 92 écoles, 507 professeurs et 12,014 élèves; il comporte aujourd'hui: 375 institutions, 1,428 professeurs et 30,472 élèves; tous les chiffres d'il y a dix ans, sont donc à peu près triplés.

Ces résultats sont encourageants pour notre petit pays; ils montrent le chemin parcouru et le bien réalisé pour l'ouvrier, avec des ressources pécuniaires relativement faibles. Il reste encore, peut-être, beaucoup à faire, mais "succès oblige" et les services déjà rendus sont un sûr garant de ce qui sera fait à l'avenir. Ces progrès, qui n'ont pas été obtenus sans vaincre des difficultés, doivent être attribués aux efforts constants du Gouvernement, au puissant appui de Monsieur le Ministre Nyssens et au zèle dévoué de M. l'Inspecteur Général Rombaut.

Permettez-moi, Mesdames et Messieurs, avant de terminer, d'attirer votre attention sur la collectivité de l'enseignement technique, organisée à l'Exposition internationale, ouverte en ce moment à Bruxelles.

Le Ministère de l'Industrie et du Travail a réuni dans cette collectivité tout ce qui peut aider à faire connaître et à étendre la cause si intéressante de l'enseignement technique populaire. Nous nous mettrons volontiers à la disposition de tous ceux d'entre vous qui voudraient nous faire l'honneur de visiter cette partie de l'Exposition.

Je crois intéressant aussi de signaler que le Gouvernement a fait publier un rapport général sur la situation de notre enseignement technique depuis douze ans; ce rapport, qui est sous presse, paraîtra incessamment.

Je me fais un devoir de soumettre à l'éminente assemblée, ici réunie, le vœu émis au moment de mon départ par Monsieur le Ministre

## I.—ENSEIGNEMENT PROFESSIONNEL POUR JEUNES FILLES.

Tableau indiquant le nombre des institutions subsidées, le nombre des maîtresses, le nombre des élèves, le nombre des diplômes délivrés et les subsides accordés en 1895—96.

DÉSIGNATION DES INSTITUTIONS.	ANNÉE 1885—86.				ANNÉE 1895—96.				SUBSIDES POUR 1895—96.				
	Nombre des institutions subsidées.	Nombre des Directrices, Institutrices et Maîtresses.	Nombre des élèves fréquentant régulière- ment les cours.	Nombre des diplômes délivrés.	Nombre des institutions subsidées.	Nombre des Directrices, Institutrices et Maîtresses.	Nombre des élèves fréquentant régulière- ment les cours.	Nombre des diplômes délivrés.	de l'Etat.	des Provinces.	des Com- munes.	Produits divers.	TOTAUX.
Ecoles professionnelles .....	3	65	866	54	14	157	2,022	133	Frs. 66,095	Frs. 10,800	Frs. 70,258	Frs. 101,040	Frs. 248,193
Cours professionnels .....	—	—	—	—	3	14	156	17	7,000	700	17,930	180	25,810
Ecoles professionnelles et ména- gères.....	—	—	—	—	6	58	467	25	22,276	6,100	27,648	26,582	82,666
Ecoles ménagères et profession- nelles .....	—	—	—	—	3	13	259	4	4,932	1,562	1,920	5,265	13,679
TOTAUX.....	3	65	866	54	26	242	2,904	179	100,303	19,162	117,756	133,067	370,288

## 2.—ENSEIGNEMENT PROFESSIONNEL POUR GARÇONS.

Tableau indiquant le nombre des institutions subsidées, le nombre des professeurs, le nombre des élèves, le nombre des diplômes délivrés et les subsides accordés en 1895—96.

DÉSIGNATION DES INSTITUTIONS.	ANNÉE 1885—86.				ANNÉE 1895—96.				SUBSIDES POUR 1895—96.				
	Nombre des institutions subsidées.	Nombre des Directeurs et Professeurs.	Nombre des élèves.	Nombre des diplômes délivrés.	Nombre des institutions subsidées.	Nombre des Directeurs et Professeurs.	Nombre des élèves.	Nombre des diplômes délivrés.	de l'Etat.	des Provinces.	des Com- munes.	Produits divers.	TOTAUX.
Ecoles professionnelles .....	2	3	87	18	12	63	833	61	Frs. 28,470	Frs. 9,600	Frs. 26,991	Frs. 26,932	Frs. 91,993
Ecoles St. Luc .....	2	8	240	—	4	39	1,544	—	20,120	1,500	—	37,199	58,819
Cours professionnels .....	1	1	30	5	2	3	55	—	692	100	802	—	1,594
Cours commerciaux, de langues et scientifiques .....	2	21	102	5	5	39	869	43	3,800	1,000	9,194	9,096	23,090
TOTAUX.....	7	33	459	28	23	144	3,301	104	53,082	12,200	36,987	73,227	175,496



## 3.—ÉCOLES INDUSTRIELLES.

Tableau indiquant le nombre des écoles, des professeurs, des élèves, des diplômes délivrés, ainsi que la répartition des élèves au point de vue de l'inscription aux cours, de l'âge et de la profession.

	1885—86.	1895—96.
Total des Ecoles existantes .....	32	40
Nombre des Directeurs et Professeurs .....	329	466
<i>Inscriptions aux Cours—</i>		
1° de semaine .....	6,997	8,867
2° de semaine et de dimanche .....	2,613	4,567
3° de dimanche .....	1,435	3,206
Population des élèves inscrits .....	9,478	13,015
Nombre de jeunes filles comprises dans la population .....	18	108
Nombre de diplômes généraux et spéciaux délivrés .....	368	684
<i>Classement des élèves par Catégorie—</i>		
1° Ouvriers .....	6,263	8,555
2° Ecoliers .....	1,490	2,313
3° Employés .....	1,355	1,571
4° Sans profession .....	370	586
<i>Classement des élèves d'après l'âge—</i>		
1° Au dessous de 14 ans .....	936	1,334
2° de 14 à 16 ans .....	3,027	3,915
3° de 16 à 20 ans .....	3,338	5,069
4° au dessus de 20 ans .....	2,177	2,697

## SUBSIDES ACCORDÉS.

	1895—96.
1° Par l'Etat .....	Frs. 250,581
2° Par les Provinces .....	124,302
3° Par les Communes .....	242,423
4° Produits divers .....	40,457
TOTAL .....	657,763

Nyssens: "celui de voir réunir le plus tôt possible à Bruxelles le prochain Congrès de l'Enseignement technique."

Notre capitale conviendrait parfaitement pour l'organisation d'un Congrès de ce genre, et comme le disait Monsieur Saignat au dernier Congrès de Bordeaux: ces réunions, pour conserver toute leur utilité, doivent être internationales et se réunir alternativement dans des pays différents. (Les Congrès de l'Enseignement technique, antérieurs à celui réuni

actuellement à Londres, ont été organisés en 1886 à Bordeaux, en 1889 à Paris et en 1895 à Bordeaux.)

J'ai l'honneur de soumettre l'idée de Monsieur le Ministre Nyssens aux Membres du Congrès et j'espère qu'elle obtiendra leur bienveillante approbation.

J'ai cru intéressant de résumer dans les tableaux statistiques qui suivent, la situation de l'enseignement technique, tel qu'il est organisé actuellement en Belgique.

## 4.—ÉCOLES SPÉCIALES.

Tableau indiquant le nombre des institutions subsidees, le nombre des professeurs, le nombre des élèves, le nombre des diplômes délivrés et les subsidees accordés en 1895—96.

DÉSIGNATION DES INSTITUTIONS.	ANNÉE 1885—86.				ANNÉE 1895—96.				SUBSIDES POUR 1895—96.			
	Nombre des institutions subsidees.	Nombre des Directeurs et Professeurs.	Nombre des élèves.	Nombre des diplômes délivrés.	Nombre des institutions subsidees.	Nombre des Directeurs et Professeurs.	Nombre des élèves.	Nombre des diplômes délivrés.	de l'Etat.	des Provinces.	des Communes.	Produits divers.
Institut supérieur de commerce d'Anvers .....	1	16	137	37	1	16	230	57	Frs. 43,475	—	Frs. 24,445	Frs. 51,396
Ecole provinciale d'industrie et des mines du Hainaut, à Mons .....	1	13	58	15	1	17	215	30	21,136	34,512	10,209	13,000
Ecole supérieure des textiles, à Verviers .....	—	—	—	—	1	9	17	—	•	•	•	•
Ecole de brasserie, rue de Bruger, à Gand .....	—	—	—	—	1	12	57	26	5,827	750	1,000	24,263
Ecole de brasserie, Institut St. Liévin, à Gand .....	—	—	—	—	1	6	19	6	2,500	—	—	4,750
Ecole de brasserie, Institut St. Joseph, à La Louvière .....	—	—	—	—	1	6	17	6	2,500	—	—	3,800
TOTAUX.....	2	29	195	52	6	66	555	125	75,238	35,262	25,634	97,209
												Frs. 109,096
												78,857
												•
												31,810
												7,250
												6,300
												233,343

\* Subside compris dans celui de l'Ecole industrielle de Verviers.

## 5.—ENSEIGNEMENT INDUSTRIEL, PROFESSIONNEL ET MÉNAGER.

Tableau récapitulatif indiquant le nombre des institutions subsidees, celui du personnel enseignant et des élèves, ainsi que les subsidees accordés en 1895—96.

Désignation des Institutions.	Année 1885—86.			Année 1895—96.			Subsides pour 1895—96.				
	Nombre des institutions subsidiées.	Nombre des Directeurs, Professeurs et Institutrices		Nombre des institutions subsidiées.	Nombre des Directeurs, Professeurs et Institutrices		do l'Etat.	des Provinces.	des Communes.	Produits divers.	Totaux.
Enseignement professionnel pour jeunes filles .....		65	866	26	242	2,904	Frs. 100,303	Frs. 19,162	Frs. 117,756	Frs. 133,067	Frs. 370,288
Ateliers d'apprentissage pour jeunes filles et pour garçons ...	46	47	926	55	60	1,158	40,330	12,870	18,553	18,636	90,389
Enseignement professionnel pour garçons .....	7	33	459	23	144	3,301	53,082	12,200	36,987	73,227	175,496
Ecoles spéciales.....	2	29	195	6	66	555	75,238	35,262	25,634	97,209	233,343
Enseignement industriel.....	32	329	9,478	40	466	13,015	250,581	124,302	242,423	40,457	657,763
Enseignement ménager .....	2	4	90	225	450	9,539	92,136 50	26,074	59,008	73,648	250,866 50
Totaux.....	92	507	12,014	375	1,428	30,472	611,670 50	229,870	500,361	436,844	1,778,145 50

# THE INFLUENCE OF VARIOUS EXAMINING BODIES ON THE PROGRESS OF TECHNICAL AND COMMERCIAL EDUCATION IN ENGLAND.

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Schemes of examination influence the education of a nation mainly in three ways; in the first place, they serve to mark out lines of study by the syllabuses they set forth; in the second, they fix standards of attainment by the amount of knowledge they require for various grades of success; and, lastly, they offer incentives to students and teachers in the shape of the distinctions and prizes which reward conspicuous success. The influence of any particular scheme of examination on the progress of education is good or bad, just in so far as its syllabuses are wisely chosen, its standards of success fixed neither too high nor too low, and its distinctions and prizes so awarded as to offer a premium for intelligent work, rather than for mere "cramming" of facts and theories.

It is proposed in this paper to consider to what extent the principal examinations, for which students of commercial and technical subjects enter, have exercised a beneficial influence on the progress of education in England, and to suggest certain directions in which alterations may be desirable.

The examinations which will be reviewed are those of

- (1) The Department of Science and Art;
- (2) The City and Guilds of London Institute for the Advancement of Technical Education;
- (3) The Society for the Encouragement of Arts, Manufactures, and Commerce;
- (4) The Universities of Oxford, Cambridge and London; and
- (5) The London Chamber of Commerce.

It will be seen that the list makes no pretence to be exhaustive, though it is believed to be thoroughly representative.

## I.—THE EXAMINATIONS OF THE DEPARTMENT OF SCIENCE AND ART.

No examinations have exerted a more widespread influence on the progress of technical education than those of the Department of Science and Art, and those who are best acquainted with the facts will be prepared to admit that, though the examinations in ques-

tion may have done not a little harm, their influence has, on the whole, been beneficial, and that steady improvement has been made in the Department's syllabuses and modes of action.

In the earlier periods of the Department's existence it was driven to adopt bad methods, first, by the lack of competent teachers; secondly, by the almost entire absence of facilities for practical work in connection with the subjects of scientific instruction which it endeavoured to foster; and lastly, by the fact that the clerical division of the Department's staff far exceeded both in numbers, and apparently, in influence, that portion of its officers which had some knowledge of science, art and technology and understood the difficulties of the teachers, and the requirements of the students. All this has been, and still is steadily changing; the number of competent teachers is rapidly increasing; well-equipped laboratories of all kinds are springing up all over the country; and the expert side of the Department's staff has been greatly strengthened. The appointment as Director for Science of a former inspector and distinguished scientist—Captain Abney—has already led to great improvements, and creates a hope that still better things may be in store.

Within the last few years the Department has taken steps to recognise practical work, not only in chemistry and metallurgy, but also in physics and biology. It is to be hoped that in a short time it will not merely recognise but will require this, and that it will take steps to encourage practical work in connection with other subjects such as mechanics and the theory of the steam-engine.

The recent establishment of separate day and evening examinations, encourages the belief that the Department may, in time, see its way to draw up separate syllabuses suitable respectively for the pupils in the day schools connected with it and for the adult artisan pupils of its evening classes.

## II.—THE EXAMINATIONS OF THE CITY AND GUILDS OF LONDON INSTITUTE FOR THE ADVANCEMENT OF TECHNICAL EDUCATION.

While the Department of Science and Art owes its origin and the funds it distributes to the action of Parliament, the City and Guilds of London Institute is maintained by the ancient trades' corporations of the metropolis.

The examinations of the institute have undoubtedly exercised a beneficial influence on the teaching of technology; but there is still room for improvement in the syllabuses of the examinations, and it is very desirable that the institute should insist more largely on evidence of practical skill.

The professional element on the Examination Board is at present entirely drawn from the staffs of the two colleges which the Institute controls, and while every one must be pleased to see these eminent teachers on the Board, it is greatly to be desired that the Institute should associate with the professors in its own colleges representatives of the professors and teachers in the leading provincial technical schools and colleges.

At present the examinations of the Institute in many subjects are quite beyond the reach of the majority of young artisans. This is unfortunate, and a great impetus to apprentices to study would be given by the subdivision of the work required for the ordinary grades into two or even more parts, which might be taken in different years. It would also tend to popularise the examinations and the classes preparing for them, if, in place of the present certificates, a "journeyman's" and a "foreman's" certificate respectively were issued to artisans who produced evidence of the necessary training in the workshops of an approved firm, and who subsequently passed the Institute's theoretical and practical examinations. The honours grade certificate might then be made still more difficult of attainment than at present, and would be suitable for those desirous of becoming captains of industry. It is only necessary to point to the fact that in mechanical engineering only 481, in boot and shoe manufacture only 208, and in calico printing only 31 candidates sat for examination in 1896, in order to convince all concerned that the Institute still covers only a small part of the field which is open to it.

### III.—THE EXAMINATIONS OF THE SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES AND COMMERCE.

The Society of Arts (to give it the title by which it is best known) does for commerce what the City and Guilds of London Institute does for technology. Meeting, as this Congress does, in the rooms of the Society, it is but proper that it should note specially the deep obligations of the business world for the care with which the Society has fostered training

in commercial subjects. Its examinations are steadily increasing in favour, and its certificates are with justice highly valued. Probably for financial reasons there is, however, in the examinations in modern languages no provision made for testing and giving credit for a candidate's ability to speak these; it is to be hoped that a way may be found to remedy this defect, and thus indirectly to help British merchants who may wish to find commercial travellers able to meet, on approximately equal terms, those whom our German cousins send out so well prepared and in such abundance. It would also be an improvement, if the Society were to issue both "Junior Clerks'" and "Senior Clerks'" certificates to students who gave evidence of satisfactory service for, say, three and six years respectively in houses of business approved by the Local Chamber of Commerce, and who subsequently passed certain of the Society's examinations: certificates of this kind would soon come to possess a very high value in the commercial world.

### IV.—THE EXAMINATIONS OF THE UNIVERSITIES OF OXFORD, CAMBRIDGE AND LONDON.

These universities influence technical and commercial education in two ways. They grant degrees to those about to become teachers, and by the local examinations of the ancient Universities, together with the Matriculation Examination of the University of London, provide tests of the completion of the substratum of general education which students should possess before they enter upon a course of higher technical or commercial training. As regards Oxford and Cambridge, enormous strides have been made of late years, in the provision of laboratories and apparatus, and their distinguished students of electricity, for example, are no longer indebted to text-books alone for their knowledge of dynamos.

Oxford and Cambridge, unfortunately, do little to encourage undergraduates to obtain a conversational knowledge of modern languages. Of course a University student should require a thorough literary knowledge of a modern language, but it is difficult to understand why, *e.g.*, in the Modern Languages Tripos at Cambridge, no marks are assigned for ability to speak the languages chosen, though candidates who can do this have their names distinguished by an asterisk.

The University of London has greatly helped technical education by requiring for its degrees

in science an adequate amount of practical work, in addition to severe theoretical examinations. As a result, many of the most important teaching posts in technical schools and colleges are filled by graduates of this University.

The Local Examinations of the Universities of Oxford and Cambridge have lately been greatly improved by the introduction of a new, though unfortunately optional, syllabus for elementary science, which involves something more than the mere book-knowledge still sufficient for success under the alternative schemes. It is to be hoped that practical work in science may soon be included in the matriculation examinations of the University of London.

#### V.—THE EXAMINATIONS OF THE LONDON CHAMBER OF COMMERCE.

The London Chamber of Commerce has put forth certain schemes for commercial education and has held examinations thereon, but so far these examinations have not been very generally accepted. A very important point in the syllabus of the Chamber is that in modern languages conversational knowledge is required. The multiplication of examining bodies is, however, in every way undesirable, and it is difficult to see why arrangements could not be made by this Chamber—or better still by the Association of Chambers of Commerce of the United Kingdom—and the Society of Arts, for an amalgamation of their forces in order to secure one set of examinations for commercial certificates for the whole country.

#### GENERAL OBSERVATIONS.

It behoves us to watch closely any attempt to establish new examinations. The Technical Instruction Committees of some County Councils are already instituting examinations of their own; in a very few cases these may be necessary to meet special local requirements. But as a rule they are not needed, and it would be wiser to endeavour to modify existing examinations, if necessary, rather than to establish new ones.

In fact there are not a few of us who would be prepared to make the establishment of a new examination a misdemeanour at the least, unless the examination took the place of one or more already in existence.

As another instance of unnecessary examinations, that conducted by the Worshipful Company of Plumbers may be mentioned. The examinations of the City and Guilds of London Institute in plumbers' work are at the least as

well arranged, and it is to be hoped that the Company may soon see its way to accept the Institute's examinations and withdraw its own.

In the important subject of cookery we suffer at present from the too great energy of the rival examining bodies. It would be matter for congratulation if they would consent to hand over their examining functions to some external body such as the City and Guilds of London Institute; the certificates issued would then have the same value all over the country, and their validity would not be confined to certain comparatively limited areas as at present.

In conclusion, it is, however, gratifying to note that in the departments of technology and commerce we do not find that multiplication of examinations which is so great a misfortune in the region of general secondary education.

#### A GERMAN TECHNICAL COLLEGE FROM AN ENGLISH POINT OF VIEW.

BY EDWIN O. SACHS.

When I handed in the title of this paper, I was under the impression that the time available for reading it would have been the conventional one hour generally given to a lecture, and I had intended making an attempt to describe the chief features of a well-known German Technical College in all its departments. As it has been found necessary, however, to reduce the time available for each paper to twenty minutes, I am afraid that I shall have to confine my remarks to one of the sections of the institution with which I am to deal.

This institution is the Royal Technical College at Berlin, which, to my mind, is the leading establishment of its kind to be found in the German Empire, or, for the matter of that, in German-speaking countries, Austria included, and the section to which I shall more especially devote my remarks will be the Architectural School or division of that institution. As an architect who has studied and enjoyed the facilities of this special division it will be easily understood that I should give preference to the department of which I have had considerable personal experience.

In the first place, I shall give a brief outline of the origin of this institution. The Berlin Technical College, as it now stands, has been in existence for only thirteen years, for it is since 1884 that it has occupied the premises it now holds. The scheme of organization on which the establishment was based,

however, dates from 1879, the intervening period being utilised chiefly for the preparation of the necessary buildings, which were designed and executed on a lavish scale. The present nature of the institution has grown out of an amalgamation of the old Architectural Academy at Berlin and the Engineering Academy of the same city, which previously had separate existences. They had passed through similar phases of development, both having been started in a very modest way during the early years of the present century. These establishments were organised under the Prussian Government, and both were owned and practically managed as the property of the Prussian people. The new institution is also essentially a Prussian one, on which the Government spends annually a considerable sum of money, and this point as to the ownership of the original, and subsequently of the new, establishments is an important feature to be remembered.

The old Architectural Academy, to which I have just referred, though only in working order in the opening days of the present century, officially dates from April 8th, 1799, when a Charter for a new "Bauschule"—literally "Building School," or better, "School of Building Construction"—was signed by the reigning king, Frederick William III. Its organisation was primarily for the education of architects and surveyors who proposed entering Government service. The first curriculum of this early period includes no less than twenty-three subjects, and, though the qualifications for entry to the classes consisted almost solely in the possession of a good character and elementary education, the scope of the instruction was by no means limited. I should, perhaps, add that this institution was one of the first of its kind on the Continent. The old "Building School" very soon became popular, and consequently its development was rapid; so much so indeed, that greater restrictions had to be placed on those wishing to become students. A few years later, we hear that one year's practical experience in an architect's or surveyor's office was a primary condition for attendance at these classes. In 1801 no less than fifty pupils attended the schools, and in 1805 the number had risen to seventy. Here I would particularly emphasise the fact that the establishment embodied only the requirements indicated by its title; it was a building school, pure and simple—not an architectural school in the modern sense. The classes were essentially of a practical nature. Architecture, as an art, and design, from an

artist's point of view, were subjects dealt with by the Prussian Royal Academy of Art, which had then, as it has now, its architectural studio, and to which members of the "Bauschule" might belong. It was not until the year 1828, when Professor Stier was one of the leading masters of the old establishment that the art side of an architectural education received the attention that it had long merited from the executive, and soon after, in 1835, more suitable accommodation for the development of this side was found in an extensive block specially erected by Schinkel. In 1849 the "Building School" underwent reorganisation, and became a *bonâ fide* architectural academy, managed on the university lines, and with all the freedom traditionally associated with German university life, and this not only refers to the organisation of the establishment as such, but also, on one hand, to the spirit with which masters treat their students, and, on the other, to the manner in which the students applied themselves to their studies. The organisation of 1849 practically remained unchanged until the great amalgamation of 1879 already alluded to. Throughout this period the courses were followed by an examination which entitled the successful candidate to certain claims for Government employment, and gave him the title of a Government architect, even if he did not chose to avail himself of a public office, but preferred to practise privately as an architect or surveyor.

It would lead me too far, were I to touch in a similar manner on the interesting development of the Engineering Academy, and hence I shall only note that in 1812 it was first known under the title of the Berlin Technical School. Its development was, as I have said, not unlike that of the Architectural Academy, both as regards classes, conditions of entry, and so on, while in 1850 it was similarly re-organised on university lines, and from that date became an engineering academy proper. Mechanical and mining engineering, naval architecture, and chemistry, were comprised in its programme, and each of these sections was, to a certain extent, regarded as a separate department of the establishment.

The amalgamation of these two academies took place, as stated, in 1879, and resulted in the establishment of the Royal Technical College, which in every way possesses a university status, and is in no way to be compared to what we term a "Technical College" in this country. In order that the college may offer

the best opportunities for the most efficient education, the executive retains the leading men of the time for its professional chairs. The social and educational status of the student is high, for every candidate is expected to have enjoyed a superior education at a first class school. From a German point of view, the expense of sending a youth to this college is by no means a small matter, though it may seem slight in comparison with English university fees. The whole time of the student has to be given up to his college work, a full course of instruction occupying four years, or perhaps longer. The Royal Technical College has its five distinct branches, or, if I may employ the academic term, faculties, (1) architecture, (2) civil engineering, (3) mechanical engineering, (4) mining engineering, chemistry and mineralogy, (5) general technical science. Each division has its distinct head, who is generally a *savant* of considerable experience elected from among the body of professors of the section in question, and the chancellor, vice-chancellor, and general council of the establishment are elected on similar lines, subject to the approval of the Government and the sanction of the Sovereign. The professorships are in the gift of the king, the tutorships are granted by the executive. The students rank with university students, and their characteristics and pastimes are almost identical. The Royal Technical College is housed in what is doubtless the finest building ever devoted to an educational establishment of this description; in fact, it is quite a palace, having considerable architectural pretensions. It cannot be too much impressed on those who have witnessed our technical classes carried on in almost squalid surroundings, how important it is that we should give to technical students a home which in every way embodies the achievements of this age of progress in technical science and does credit to the period of architecture to which it belongs. I should much like to describe the beautiful building and its practical equipment, which might well serve as a model to the world, though its conception is perhaps almost too elaborate and too costly from an economic point of view. I must, however, content myself with saying that its dimensions are approximately 700 feet by 300, that it has five courts of which the central one is covered in, and that it has four storeys, all of considerable height. Its lecture rooms are spacious and numerous, and its class rooms and studios thoroughly serviceable and well lighted. The

number of students for which it was intended was two thousand, and to-day, although there are 2,913 on the books, it still admirably fulfils its purpose; but the popularity which its educational facilities have won for it will no doubt soon compel a considerable extension being made. Of these 2,913 students, I should here perhaps at once add that there are only 366 architectural students fully matriculated, with 221 non-matriculated, making in all 587, whilst the mechanical engineers number together nearly 1,300. I should also, perhaps, add that there are a considerable number of foreigners among the students, Russia, for instance, regularly sending a large contingent.

But, turning now to the courses available for students of the architectural section, I ought first to say that besides the subjects taught in the architectural division proper, much that is valuable is to be learned from the civil engineers' department, in the general technical classes, &c., and special facilities are afforded to the architectural student for attending suitable lectures in other sections. The architectural division has eight ordinary and twelve extraordinary professors, and fifteen tutors, headed, as I have said before, by a divisional chief elected from among the professors. The courses available include a large number of different lectures on various periods of architectural and art history; with elementary and advanced drawing, free-hand, perspective, geometrical and architectural draughtsmanship, water-colour work and modelling. Then again there are classes for the general planning of private dwellings and public buildings of all descriptions, for design in various specific styles and for divers purposes, the designing of ornament, of furniture, of lead-glazing, metal work, &c. In addition to these, there are exhaustive lectures on the evolution of particular features in design, such as that of ornament; while among the more practical subjects every form of construction is taught, from the simplest brickwork to the most complicated iron-roofing. The characteristics of different materials are also important subjects dealt with, as are heating and ventilation. Special forms of building are also treated as separate subjects, as well as the various equipments. For instance, we find lectures on the necessary appliances for hospitals, prisons, and libraries. Building legislation is moreover not overlooked. Turning to the lectures which are given in other sections we find those on mathematics, physics, statics, geology,

chemistry, book-keeping, and general elementary law, included in the curriculum of the general science division, and in another department the housing of the working-classes—in fact, there are few German requirements which are not fully attended to at this college. I use the expression “German requirements” advisedly, for sanitation, which really occupies a very secondary position in a German architectural practice, receives scant treatment at this institution. And again, the measuring up and sketching on the spot, which we consider so important, the German architect does not appear to appreciate, and as a subject of study it is almost overlooked in the Berlin curriculum. Of course the student has to select his own subjects and to distribute them over the four years which he spends at the technical college, and if we turn at random to the list of subjects taken up by a first year man on, say, a Tuesday, we may probably find that in the forenoon he attends lectures of an hour each in mathematics, elementary construction, and a class in elementary drawing; and in the afternoon, perhaps, a lecture of one hour on geology or materials, followed by a class of elementary draughtsmanship of from two to three hours’ duration, including, say, instruction on the classic orders. If we were then to take a fourth year student’s list for the same day, we might, on the other hand, find a two hours’ lecture on the history of architecture, and a two hours’ class on design in the Renaissance style; then, in the afternoon, he may give a couple of hours to practical design, such as the planning of public buildings, and attend an hour’s lecture on heating and ventilation. From these examples it will be seen that in the earlier stages of the Berlin student’s work, he seeks to obtain a foundation in draughtsmanship and science, while at the latter end of his course he devotes most of his time to the designing of buildings, some to historical study and to gaining a knowledge of special equipment. It would no doubt be interesting to follow the architectural student’s career from year to year or from term to term, but this would take too long, and I therefore only quote a couple of examples from a student’s time-table.

But now, after these historical and descriptive notes on the Royal Technical College at Berlin, I would ask if there are any disadvantages in the system of architectural education adopted by the Prussian Government. To my mind, though the opportunities for study are delightful, there is obviously something

wanting in the whole system. Every preparation is made for the student to obtain knowledge, yet the result is by no means as satisfactory as might be expected. Does not this arise primarily from the student starting fresh from school without any previous elementary practical knowledge of construction? He has never been on a building in the course of erection, and does not know the difference between a piece of oak and a piece of deal. Further, owing to his not having seen an actual moulding cut, he has no idea of the method of its production. For four long years he spends nearly the whole of his time in theoretical study, and, as far as my experience goes, there are but few men who utilise even the smallest part of their leisure in getting some idea of the nature of practical work. Does not a school where merely the theory of architecture is taught have a tendency to produce an architect of an academic character, though of course there may be the usual exceptions of brilliant and talented men, or those who are ambitious and energetic and who do not follow the lines laid down for them? Do not many of the masters, too, in such a school, soon lose all touch with practical work; and, though brilliant scientists or historians on receiving their professorships, do they not lose all sympathy with the movements of the times, and even by going through the same course regularly, year after year, become mechanical and uninteresting in their methods, inspiring no enthusiasm in their pupils? I think there can be little doubt that, as in Berlin, for instance, so always the best and most popular masters are those few who keep in constant touch with current thought and practice.

As to the remedy for any unsatisfactory results, would it not be advisable that a boy should have a year’s practical work in an office, with the run of some works for at least six months before he starts his elementary studies at the college, and should not every six months of theoretical study be interspersed with three months of practical work? Should not lessons in design be accompanied by lessons in the measurement of existing buildings, to enable the student to grasp the appearance of what he is putting on paper? Would it not be well, too, that the instructors in design, construction, and special equipment, should one and all be men actually in extensive practice, and that such subjects as history, the elementary sciences, and freehand drawing, should be left to men whose vocation is chiefly to impart knowledge, yet who should be compelled to



keep themselves abreast of modern progress?

We have had under consideration an establishment organised on the most elaborate lines, in which there is but little left to improve, as far as the syllabus of the classes is concerned. The Berlin Technical College has been on its trial for over twelve years, and the results, to my mind, are not at all proportionate to the amount of time and money expended by the architectural student and the Prussian Government. Indeed, as the Berlin Technical College is in many respects a model to those advocating architectural education, so it must also serve as a warning to those extremists who would advocate merely theoretic study as the primary basis of a training in architecture and its actual practice. Much as we can learn from leading men in special technical subjects, the Berlin College only too plainly shows what harm can be done by taking an able man entirely away from his profession, and thus preventing him from keeping in touch with that practical work which brought him into prominence.

I would conclude by saying that the architectural school at the Royal Technical College of Berlin is an institution well worthy of our attention, and in many respects of our imitation; but, at the same time, we must observe the disadvantages of too theoretical an education, and its evil effect upon a student destined for actual practice. What I have said with regard to the architectural school, I believe, holds good in many respects for the several engineering divisions of the same college.

## THE SOCIETY OF ARTS' EXAMINATIONS.

BY SIR HENRY TRUEMAN WOOD, M.A.,  
Secretary of the Society.

The Society's Examinations are conducted simultaneously at a number of different centres throughout the kingdom, through the agency of local examination committees established for the purpose by the Society. The papers in each subject are sent down in separate envelopes to the secretary of the committee immediately preceding the day of examination. The envelopes are opened in the presence of the candidates, and the papers distributed. The worked papers are sealed up at once and despatched to the

office of the Society. In the present year, 1897, 7,513 papers were worked by 6,919 candidates at 221 centres. The subjects in which examinations are now held are:—1. Arithmetic; 2. English; 3. Book-keeping; 4. Commercial Geography; 5. Shorthand; 6. Type-writing; 7. Economics; 8. Précis-writing; 9. French; 10. Elementary French; 11. German; 12. Elementary German; 13. Italian; 14. Spanish; 15. Elementary Spanish; 16. Portuguese; 17. Russian; 18. Danish; 19. Chinese; 20. Japanese; 21. Domestic Economy; 22. Rudiments of Music; 23. Harmony; 24. Practice of Music.

The examination system of the Society of Arts was an outcome of the Great Exhibition of 1851, which, as is well known, was originated by the Society.

In November, 1851, Mr. Harry Chester, then a Vice-President of the Society and afterwards Chairman of the Council, submitted to the Council a scheme for the formation of a union of mechanics' institutions, the principal object of which was to encourage the founding of such institutions, and to develop the educational facilities which they provided.

Among the early suggestions for the utilisation and development of such institutions was a proposal for a general system of examinations among their members. In December, 1853, Mr. Chester definitely proposed the establishment of such a system, and in the spring of 1854 a scheme of examinations was published. The scheme was of a very comprehensive character, and included the following subjects:—1. Mathematical Sciences; 2. Experimental Sciences; 3. Sciences of Observation; 4. Mechanical Sciences; 5. Social Sciences; 6. Fine Arts; 7. Moral and Metaphysical Sciences; 8. Literature. This very elaborate programme proved a little impracticable, and it is not to be wondered at that only a single candidate offered himself for examination in March, 1854. The promoters of the movement were not, however discouraged, the scheme was remodelled, principally by Dr. Booth, at that time an active member of the Society, and in 1856 an examination of 52 candidates was held at the Society's house. The subjects of this first examination were:—1. Book-keeping; 2. Arithmetic; 3. Algebra; 4. Mensuration; 5. Geometry; 6. Mechanics; 7. Chemistry; 8. Animal Physiology; 9. Botany; 10. Agriculture; 11. Geography; 12. Physical Geography; 13. English History; 14. English Literature; 15. Latin and Roman History; 16. French; 17. German; 18. Freehand Drawing.

In the following year, 1857, the first attempt at provincial examinations was made, and an examination was held at Huddersfield, as well as in London, the examiners of the Society going down for the purpose. The desire of increasing the number of examination centres, and the obvious impossibility of sending examiners simultaneously all over the country, led in 1858 to the elaboration of the system of local committees to supervise examinations worked from a single centre.

The Society of Arts, however, cannot claim the sole credit of the invention of the system of local examinations. In 1850 the College of Preceptors (established in 1846) was considering the best means of examining the schools of its members. It commenced by sending down examiners, but in 1853 the experiment was tried of collecting pupils to a centre and examining them by means of papers sent down from London. The experiment proving successful, the system was regularly organised in the following year, 1854, and has been continued ever since.

It will be seen that the College of Preceptors' Examinations preceded those of the Society of Arts by two years, but the objects, the conditions, and the methods of the two systems have been so different that there has never been any but the most friendly rivalry between them. In 1856 a conference was held at the Society's house between representatives of the two bodies, the College being rather afraid that the Society's Examinations would interfere with their own. It was soon apparent that the two systems were intended to occupy different ground, and were not likely to affect one another. In practice this has proved to be the result, and it has never been found that the two systems have interfered in the least with one another.\*

To the Society's Examinations in 1858, 58 institutions sent up 288 candidates; in the following year there were 480; in 1860, 586. The numbers increased steadily till 1865, when there were 1,899; the next year showed a slight diminution, and then there was a further increase, till the number of 2,160 was reached in 1869.

The University Local Examinations were established in 1858. The establishment of Elementary Drawing Examinations by the Department of Science and Art was about

contemporaneous with that of the Society's Examinations. The Science Examinations began later, in 1861, and as these developed, it was found that the Society's Examinations were in many respects competing with those of the Department. The same candidates were being examined in the same subjects, and there was an evident waste of power. In 1870 this led to the abandonment of 17 out of the 36 subjects then included.

In 1871, when the Council were considering the establishment of a system of Technological Examinations, of which an account is given below, they passed a resolution to discontinue the General Examinations, but on the application of some of the more important of the Institutions in Union, they rescinded the examinations resolution and determined to continue for a further period. This was done, on the same system as before, till 1876, when the programme was revised, and the plan on which certificates were granted was somewhat modified. Previously, certificates had been granted for single subjects, but in that year a "Commercial Certificate" was established in addition, to take which it was necessary to pass in, at least, three subjects. Very few of these certificates were ever taken, the system of single certificates for single subjects being more popular and better suited to the needs of the class of students who take up the Society's Examinations.

In 1879, the question of abandoning the examinations again arose, it being thought that the ground was covered by other agencies. To quote from the report of the Examination Committee in 1879:—

"The Committee feel that the time has now come when the Society should cease to compete with other educational agencies more influential in the work of examination. With the Educational Department examining millions of children in elementary schools, and thousands of young persons in night classes; with the Universities holding their local examinations throughout the country, for young persons of a higher class; with the Science and Art Department examining students in every branch of science and art; with the new City Institute developing yet further the Technological Examinations just handed over to them by the Society; with other agencies, such as the College of Preceptors, doing kindred work, the Society of Arts may well retire from the field, having in all these various directions acted as the pioneer. It held science examinations before the Science Department, examinations in literature before the Universities went afield to meet the classes who could not go to Oxford or to Cambridge. It has seen the system it established develop, with the aid of

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\* The writer of this memorandum may be permitted to mention that he was for a short time one of the examiners of the College.

Government funds, as it could never have grown without such help, and the time has now arrived when it may cease to compete with the agencies it has done so much to foster."

In pursuance of the course mentioned in this report, no examination was held in 1881, but again, however, some of the institutions where the examinations were held protested, and on further consideration it was determined to continue the examinations, but to try whether they could not be made self-supporting. Hitherto they had been free. In 1882 a fee of 2s. 6d. was charged to each candidate, and this charge has been continued to the present date. The "Commercial Certificate" was abandoned and the old system was resumed of giving a separate certificate for each subject. The natural result was a considerable falling off in the numbers examined. In 1882 only 695 papers were worked as compared with 2,325 in 1880. The numbers, however, soon began to increase again. In 1890 there were 2,474; in 1894, 4,375; in 1895, 5,108, and in the present year, 7,513. This very considerable increase is doubtless, to a very great extent, due to the fact that the County Councils have now large funds available for the promotion of technical education; and that certain commercial subjects are scheduled by the Science and Art Department as subjects coming within the scope of the Technical Instruction Act, 1889. The commercial subjects so scheduled are precisely those in which the Society of Arts has now for just forty years been holding examinations.

The Technological Examinations, referred to above, were instituted in 1873, at the suggestion of Sir John Donnelly. These examinations were intended to test the knowledge possessed by artisans of the subject matter of their respective industries. It was arranged that they should be held in connection with the May examinations of the Science and Art Department, the technological papers being given out with those of the Department. Before a candidate could obtain a certificate, he was required to pass a Department examination in certain specified science subjects, these varying according to the technological subject taken up. Certificates of three grades were given, elementary, advanced, and honours, corresponding with those of the Department examiners. No attempt was made to test practical skill, but each candidate was required to produce a certificate from his employer in which his competence was stated. The number of candidates was never great. In the first year (1873) only six entered and the numbers

gradually increased to 68 in 1870 and 184 in 1878.\*

In 1879, on the foundation of the City Guilds' Technical Institute, the Technological Examinations were handed over to that body. From the funds placed at its disposal by the City companies the Institute was able to offer to teachers payments on the results of the examination in the same manner as the Science and Art Department does for its examinations. Teachers were thus enabled to form classes and send pupils for the examination, and a large increase in the number of candidates took place. These examinations now form an important part of the Institute's work, and attract annually a very large number of candidates. In 1897 the number entering was 29,494. Large additions have also been made to the list of subjects, which now number 63. No great change has been made in the general character or system, which remains much the same as that proposed by Sir John Donnelly, but the details have been considerably modified, and in some cases a practical examination, to test handicraft skill, has been provided.

In addition to the examinations above referred to, the Society conducted, from 1856 to 1894, Elementary Examinations. These were really carried on by District Unions and Local Boards in connection with the Society. All the Society did was to supply identical examination papers, the results being examined and certificates awarded by examiners appointed by the Local Boards. The Society supplied the certificates, but accepted no responsibility as to their award. The system, though useful at its first establishment, was never found to work in a very satisfactory manner, and in 1895, the place of these examinations being better filled by examinations entirely under the control of local institutions, the Society's system was abandoned.

## THE TEACHING OF DRAWING IN CONNECTION WITH TECHNICAL AND COMMERCIAL EDUCATION.

BY T. R. ABLETT,

Honorary Director, Royal Drawing Society of Great Britain and Ireland.

Whether Englishmen have less art appreciation than some of their continental neighbours,

\* The following were the subjects included in the 1878 examinations:—Cotton manufacture, Paper, Silk, Steel, Carriage-building, Manufacture of Pottery and Porcelain, Gas manufacture, Glass, Cloth, Silk-dyeing, Wool-dyeing, Calico-bleaching, dyeing, and printing, Alkali manufacture, Blow-pipe analysis.

is a matter of controversy, but there is no doubt that in English schools drawing receives less time and attention, and is taught to fewer pupils than in many other countries.

In France, it is taught to every boy and girl in primary schools for four hours each week, and in secondary schools for eight hours.

In Germany, Austria, Belgium, Sweden, Switzerland, and some of the Australian colonies it is compulsory for all children. It is said that it will soon be as disgraceful in America not to be able to draw, as not to be able to read and write.

Contrast this with the state of drawing in England. In the elementary schools not more than two hours is given to the boys who are taught, and the girls need not learn at all. In the secondary schools, many boys and girls are not taught, and one hour a week, or a little over, is considered ample for those who do learn.

No one can deny the advantages of *mechanical drawing*. The individual who can draw with ease and accuracy, can gain skill in any kind of manual industry much more quickly than would be possible without such power. The drawing of an object is an excellent preliminary to the making of the same. The acquirement of accuracy in measurement produces habits of precision which directly lead up to skilful handicraft. The difference between the skilful and unskilful workman is mainly that the former fashions his products the exact size required, and the latter makes them wholly or in part too big or too little for their purpose, and so wastetime and material for which the consumer pays. It has been said that nine-tenths of English workmen cannot understand a plan, elevation, or section. Waiting for the foreman's explanation increases the cost of production by wasting the workman's time. Drawings are superior to spoken or written language, in supplying adequate means for making inventive thought manifest. Working mechanics often waste time and money in making models that will not act. A knowledge of drawing would enable them to put their ideas on paper, and save the waste involved in making a useless model. Similarly geometric drawing is most useful in connection with the study of physics and engineering. By its aid the higher mathematics can be understood before it is possible to learn the processes of exact mathematical proof.

There are many advantages to be derived from *artistic drawing*, not only to art manufacture, but to general education. The Royal Commission appointed to inquire into the Ele-

mentary Acts reported, "That drawing is a subject of the utmost importance, and that at no time in a child's life can it be so easily taught as during the period of schooling."

Why does England miss its golden opportunity in the boys' and girls' schools? Is it not because those who have charge of the general education of the children in this free country, have never been convinced that drawing is a means of training a child's faculties. *There is great danger that they may become still less sympathetic if those who are interested in technical education speak only of the training of the hand and eye, and ignore that which is also essential to drawing—the training of the mind.*

The Royal Drawing Society has made a serious effort to win the co-operation of the general teacher, and its success demonstrates the possibilities in this direction. It has gathered to it hundreds of schools, and many thousands of their pupils have been candidates in its annual examination, or exhibitors in its annual exhibition.

This Society makes clear that the cultivation of the observation is an essential in acquiring skill in artistic drawing, as it is in developing the general intelligence, and the great economy of constantly employing drawing to record the results of observation whatever be the subject of study. Especially is this desirable in the case of young children. Differences of shape greatly excite their minds. New shapes, beside the charm of novelty, indicate structure and use, and a child is naturally impelled to employ the readiest language (drawing) in setting down its recollection of them. The thoughtful general teacher can find out the accuracy of a child's touch with its environment by carefully considering these spontaneous records, and by judicious encouragement develop the mind and drawing power *puri passu*. There is no doubt that under favourable circumstances, this spontaneous drawing of childhood develops and merges into the draughtsmanship of the adult artist, as is well illustrated by the history of Giotto, Sir John Millais, Sir Edwin Landseer, Sir John Tenniel, Mr. Briton Riviere, and many others.

The schoolmaster's task is not increased, but made easier, by incorporating drawing with the other school subjects, and this is true not only of artistic drawing but also of mechanical drawing. Drawing to scale, and the drawing of plans and elevations, if taught as an essential part of map and contour drawing, assist the

acquisition of geography, and make the diagrams of science and other school subjects easy to read and remember. A noisy appeal to the ear has hitherto been chiefly relied upon, and the possibilities of acquiring knowledge quietly through the eye has not been sufficiently considered. Memory drawing aids the spelling of English words which demands a power of remembering the look of words, since their sound is not always a trustworthy guide, and it renders easier the difficult forms of the script letters, which must all be stored in the memory. It also aids the imagination by making more definite the mental picturing of many facts of history and of physical and political geography, and it makes the recollection of various appliances and scientific apparatus more thorough. All this drawing, which is the natural outcome of a schoolmaster's efforts, would be a boon to the technical school, in that its new pupils would possess on entering a practical knowledge of a subject which underlies nearly all its work.

The Royal Commission on Technical Instruction, no doubt for similar reasons recommended for elementary schools, "That the Inspectors of the Education Department, Whitehall, be responsible for the instruction in drawing."

The opinion of various authorities supports the view which the Royal Drawing Society takes, of the importance of drawing as a means of general education.

The late Lord Leighton wrote to me, December 13, 1894—"I am strongly in favour of widespread and general teaching at school of drawing, as a practice likely to develop the perceptions, strengthen memory, and usefully train the hand."

Mr. Briton Riviere, R.A., in a speech reported in the *Times*, February 1, 1896, said:—"He thought that the use of drawing, not as an end, but as a means to an end, that end being the cultivation of the mind, had been far too much neglected among us."

Dr. Bryant, a member of the Royal Commission on Secondary Education, in a speech reported in the *Daily News*, February 8, 1896, said:—"Every child should learn to draw, for drawing was an expression of the human mind, and those who were deprived of it were handicapped on one side of their mental development. The mind developed by expressing itself, and it was therefore important to develop visual imagination, and to cultivate visual imagination through the hands."

The Royal Drawing Society, in its efforts to

encourage drawing as a means of general education, has found it necessary to recognise certain principles as essential to the task of teaching every boy and girl to draw:—

1. That the methods of teaching need to be adopted to the natural evolution of drawing power in children.
2. That the instruction must necessarily be imparted by the collective method, which has been found of absolute importance in teaching large classes the other school subjects.
3. That the limited time afforded for the study of the subject prohibits the use of any but the most direct and expressive processes of delineation.

Sir Henry Trueman Wood, who presided when I read a paper in this room on May 2, 1888, on "Drawing as a Means of General Education," said:—"The uses of drawing were obvious, but it was a novel point to insist upon it as a method of training the mind." It is by so encouraging it that the Royal Drawing Society has secured so large an amount of co-operation in the schools, and it seems desirable to press upon this Conference the harm of losing the sympathy and very valuable help of the general teacher by dwelling on the uses of mechanical drawing as a means of training the hand and eye, without also insisting on the mental training, and help to general education of both mechanical and artistic drawing.

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WEDNESDAY MORNING, 16TH JUNE.

SECTION B.

Major-General Sir OWEN TUDOR BURNE, G.C.I.E.,  
K.C.S.I., in the chair.

## AGRICULTURAL EDUCATION.

BY F. J. LLOYD.

### THE OBJECT OF EDUCATION.

The object of education may be defined as that training in youth which will enable a man to earn his own living with the minimum effort and the maximum return.

This can only be attained by utilising to the fullest the natural gifts, powers or faculties—call them what you may—with which each one is more or less endowed by nature.

Hence it is not surprising that Herbert Spencer has defined the object of education in the following words:—

"How to live? How to use all our faculties to the greatest advantage of ourselves and others—how to live completely? This being the great thing needful for us to learn, is, by consequence, the great thing which education has to teach."

The greater portion of mankind earn a living by manual rather than by mental work. Hence a perfect system of education should not only discover but train both the manual as well as the mental capacities of each individual.

Agricultural education more than any other demands this double training. The pursuit of agriculture requires great manual skill, while every operation is influenced by more natural forces and utilises more natural laws than the operations of any other industry in the kingdom. It is almost superfluous to mention that the study of these laws is termed science.

#### EDUCATION IN THE PAST.

But what has been the education given in the past to those who would follow the pursuit of agriculture. In the education of the past, as in much of that given at the present time, the fact that men were possessed of such faculties has been utterly ignored, much less that these faculties varied with each individual. Hence there has been no attempt to draw out or train these faculties, the sole object of education being to cram a certain number of useless and disconnected facts or pseudo-facts into what is termed the brain. Teachers recognised one faculty, and one only, viz., memory, and to train this one faculty to the neglect of every other has been the sole object of education for ages past, and remains so mainly to the present day. It has entirely neglected to develop manual skill, it has neglected to draw out or cultivate any mental faculty save memory, and even for this purpose has utilised subjects, the recollection of which would in no wise benefit the future farmer. But far worse than this it has neglected the most valuable of nature's gifts to all of us, the strongest natural faculty we possess, observation. What is the most striking faculty possessed by a child from three to six years of age? The power of observation. Watch that same child between the ages of thirteen and sixteen and the power, though at times manifesting itself, is gradually becoming dormant, partly because it has not been cultivated, partly from its constant suppression by the ignorance and heedlessness of those who surround the child.

Ten years later the faculty is practically non-existent, lost from neglect of use, as a singer might lose the power of song, a musician the power of execution.

The difficulty now found in improving agricultural education depends greatly upon this failure of the past.

#### RURAL CONTEMPT FOR EDUCATION EXPLAINED.

Many leading farmers are men whose so-called education, I should prefer to call it "schooling," has been of the slightest and worst description. They now know, from experience, how little that "schooling" has contributed to their success in life, probably not one jot or tittle. Such men look askance at education and modern educational movements. If they do not openly oppose them as unnecessary, they remain passive on-lookers, saying or thinking, "I managed to do without such education; why should it be necessary for the coming generation?" Hence in rural districts throughout the whole of England the progress of education, especially of technical education, has been slow, and has met with considerable opposition. The reasons for this are really threefold. First, those who have been successful farmers know by experience how little they owe their success to the schooling of their early days. Secondly, they cannot appreciate how the knowledge whereby they have succeeded and which they obtained from practice, can be obtained in any other way than by the long and narrow path of experience which they have traversed for years. And, lastly, where they have watched the gradual growth of modern education, they find it difficult to discover results which in their opinion are commensurate with the trouble, time and expense that has been bestowed on the work.

Let me try to meet these arguments. What does success in every industry depend upon? Success depends upon a combination of skill and knowledge. Skill is the outcome of experience in manual work, whether it be the skill of an artist, a musician, a cheese-maker, or a plough boy. In every instance such skill is the outcome of experience or practice, without which it can never be attained. Knowledge on the other hand, is the result of study (reading), observation, or research (experiment); its attainment similarly depends upon continued effort, and is limited only by the natural faculties of each individual. Such are the two essential factors of success in every

industry, and in farming they are as necessary as they are to an engineer or to a surgeon.

It is evident that skill cannot be taught. At the same time manual operations may be performed in two ways: the one, being the better, is termed the right way, while the other, being less efficient, is a wrong way. The instruction which teaches how to do work with the least waste of energy and time is manual instruction.

Unfortunately, few people distinguish between manual and technical instruction, yet technical instruction is quite distinct from manual instruction. Technical instruction would teach the reasons why work done in a particular manner should cause less waste of energy than doing it in some other manner. Hence it is evident that no amount of technical education alone would make a man a skilled artisan.

Let me take an illustration. By experience a woman may become proficient in all the manual operations necessary to the manufacture of a cheese; she is a skilled cheesemaker. Yet such a woman may be absolutely ignorant of the reasons why the operations she performs result in a good cheese. In such a case she is deficient in technical knowledge. Education which will supply this defect is truly technical education. On the other hand, let us suppose that, by attending classes, by reading, and by watching others make cheese (observation) a girl becomes imbued with a knowledge of all the principles of cheese making. Could she make one? No. She would lack skill, the manual ability which practice alone can bestow, and without which success is as impossible in every industry as it would be in cheese making.

If, then, skill and knowledge are both essential to success, how does it happen that so many farmers who started life with but little education have been so successful? Because, unconsciously perhaps, but none the less surely, while obtaining manual skill they have also obtained knowledge. Skill has come by degrees, and knowledge has followed slowly on the heels of manual dexterity. How? Chiefly as the result of observation, and from conversations with their fellow-men; partly by experiment, and still less, perchance, from reading, some farmers have acquired knowledge in addition to their skill. This it is which has enabled them to outrun their fellows in the race of life. But I challenge any one of them to say that their position has been attained simply by manual dexterity, or

that they are not indebted to natural faculties of memory, of sight, of touch, or of smell, developed, perchance, long after the days of schooling, though they ought to have been first trained then.

Such has been the system of education of those who have succeeded in agricultural pursuits in the past. That the schooling of such men has contributed absolutely nothing to their success is the fault of the schooling. Did it attempt to discover manual dexterity? Did it ever train the power of observation? Was even the word "experiment," much less the reality, known? Who can answer in the affirmative? A little time well spent in acquiring the three R's, but much wasted in storing up useless facts, was the training considered suitable to enable men to cope with nature and nature's laws, to compel the vegetable world to yield her treasures, and to subjugate the beasts of the field to the service of man. What an ignoble training for a noble career.

It is not to be wondered at that, so trained, and having gained useful knowledge solely as the result of experience, men should now look askance at education. Yet the results of education and experience are the same.

Let us take a simple illustration. Two farmers think of buying a cattle food of whose use they have had no experience. One buys it, uses it, and trusts to luck whether it proves profitable or not, *i.e.*, he follows his previous habit of paying dearly for his experience, and in course of time finds out its value. The other follows the more modern system of seeking first instruction; in other words, he asks his friends whether they have tried it, or he sends it to some expert to advise him as to its value and use, or he looks in the agricultural papers to see what strangers have written about it. No matter in which of these three ways he may obtain information, that information is to him technical instruction, for all technical information gained from the experience of others, come to one how it may, is technical instruction. Now the principle which governs our modern views of education may be briefly stated in the old saying, "Art is long, life is short." We cannot afford, like the first of these two farmers, to seek out each one of us, the principles which govern the universe. We must be content to accept much as proven, for we cannot hope to find either the time or the means to prove everything for ourselves. Indeed, why should we attempt to go over ground which someone else has travelled and reported on fully? We live in a hurry, let

us gather all the information possible, so that we may lose no time in the pursuit of that which others have found lead to failure.

This desire has resulted in the collection and classification of past experience in all and every industry, and the information so accumulated forms our stock of technical knowledge. By studying this accumulated experience, by close observation, and by experiment, certain truths are deduced which may be said, so far as can be judged, to be of universal application. These, if properly expressed, become universally true principles. Such, for example, is the simple statement, "Every plant requires phosphates," and the collection of these principles, with the facts upon which they are based, we term Science. As the late Professor Huxley truly said, science is merely common sense, or experience classified.

While I grant that no theoretical education can ever be so strikingly impressed upon the mind as is the actual result of experience—especially when that experience results in a considerable loss, as frequently happens, yet the very object of technical education is so to instruct men that they may avoid these losses, these dearly-paid-for bits of experience. Hence the man who asks what has been gained by technical education, fails altogether to grasp its primary and chief object. Really what one wants to know is, what would have been lost by those who have obtained technical instruction if they had been without it. If the knowledge had been obtained, as of yore, by experience, with its necessary failures, what would it then have cost? Who can estimate the enormous price at which in the past farmers have bought their experience? The money now spent in technical education is an insignificant widow's mite by the side of this incalculable sum.

#### THE FUTURE.

Having endeavoured to show the inefficiency of the education given in the past, and the evil results which it has led to, let me briefly outline what I think desirable in the future.

Having been engaged for some years as an examiner for several County Councils, as well as for the British Dairy Farmers' Association, I have come to the conclusion that the elementary and secondary education given in rural districts has been disgracefully inefficient, and renders many who would now be glad to benefit by technical instruction utterly unable to do so.

If, as I maintain, one reason for the partial

failure of agricultural technical education has been the inefficient elementary and secondary education given in rural districts, it becomes evident that these are interdependent, and must be recognised as such. Unfortunately, this co-relation has not been recognised in the past, and its disregard is one of the main reasons why in educational matters we are behind those who are becoming our chief competitors.

We hear of an "educational ladder." It is a fiction. A ladder presupposes uniform steps. Are there any uniform steps in our educational system? The elementary schools are conducted with utter disregard for the secondary schools; the secondary schools stand aloof from the elementary schools and from the technical schools; and the technical education committees have gone their way ignoring alike both elementary and secondary education. Then what a farce it is to talk of an "educational ladder." No such ladder exists in England, and until it does our educational system will not be satisfactory.

Elementary, secondary, and technical education are studied, spoken of, supplied, and controlled separately, and by separate bodies, having no consideration for each other, and a total inability to recognise their mutual dependence. Hence the system of education in England has been a failure, and must be remodelled. It is suicidal mania to treat the education of the nation piecemeal. What is wanted is one sound graduated scale of progressive education—a ladder, if you will, each step of which shall be as separate and independent as may be, provided it is equi-distant from other steps, and bound together into one useful whole by the two main supports—manual skill and technical knowledge.

Those for whom agricultural education has to be supplied, may be classified under two categories. The first includes all those who are yet receiving elementary or secondary education in rural districts, the second, those whose education, so-called, is finished—who have joined the body of workers.

For the future generation, a thorough reform of the whole system of education is imperative; nothing less will suffice.

The elementary education of the country must be made more practical, must be so remodelled as to draw out all the faculties of children. It must be more strictly delineated, and not allowed, as is the growing tendency of the age, to encroach upon secondary education. In my opinion it would be well if, as in



many schools of France,\* the subject of agriculture formed one of the primary subjects of elementary education in rural districts.

The secondary education of the country should commence where elementary education leaves off; the secondary schools being replenished with the best scholars from the elementary schools by a perfect system of scholarships.

It is quite impossible to expect that every rural district shall have its secondary school. These must be placed in the localities where they can secure the largest attendances of day scholars, but they should also be boarding establishments for scholars from districts where no secondary school exists.

The scholarship pupils would only form a portion of the scholars, and should be those whose parents were not in a position to pay for this secondary education.

Secondary education should be given in two stages—the first, general; the second, slightly specialised and destined to train for the higher education, whether that be professional or technical.

From these higher secondary schools the technical institutes of the country would be replenished with pupils.

Lastly, it is necessary, if progress is to be made in any industry, that there be a continual search after new truths, or, as it is now termed, "original research." Were it not for the ever-increasing stock of knowledge due to original research, education would soon become stagnant. Fortunately, there seems at present little chance of this. But it is imperative we should realise that success in every industry depends more upon original research and new discoveries than upon the most complete knowledge of what is already known. And though it is the habit at the present day to look upon research as no part of education, yet this is a mistake. Research is the spring from which the whole stream of knowledge rises, and the ultimate result of education is so to train a man that he may himself become a new source from which the living waters of knowledge may flow.

Those who come under the second category who are already workers among the agricultural classes, yet might benefit from instruction, especially from technical instruction, are of three classes. First, those who, not having sufficient elementary education, must confine

their attention to manual instruction, and for whom such instruction alone is suitable. Such, for example, are the larger proportion of the pupils who attend migratory butter schools. Another class is composed of those who, possessing sufficient elementary and secondary education, need efficient technical instruction. These, who ought first to receive the care of technical education committees, have in the past been the very class most neglected. To them, for instance, a ten days' course of instruction in a travelling dairy school is utterly inadequate. What they need is at least a three months' course of combined manual and technical instruction. Such counties as do not possess an institute where this instruction can be obtained ought, by means of scholarships, to enable that technical education to be obtained in any institute outside the county where it best can be.

Lastly, there is a class—by far the largest—who could better benefit by technical instruction than any others—I refer to the farmers themselves. They possess to the full manual skill, combined with no small amount of technical knowledge gained from experience. Such men can have technical education placed before them in only three ways—by papers, by books, or by lectures. The agricultural Press and the agricultural Societies sufficiently supply the first two means. Why have the Technical Education Committees not utilised the third? To a certain extent they have, but how? They engaged young university men, utterly ignorant of both practical farming and even the results of agricultural experience, to give lectures to an audience whom they neither understood nor appreciated, and the whole system was a failure. And because this means of technical education was a failure when improperly conducted, it has been unduly neglected. I am of opinion that, if properly carried out, and men of experience and repute, both practical farmers and scientific men, were selected as lecturers, much might yet be done by its means.

Lastly, there is the instruction, which can only be given in the houses of individual farmers—one might almost call it personal help. This is often needed to enable men to overcome some difficulty beyond their own powers, a difficulty which often demands the assistance of the ablest expert. Such experts are placed at the disposal of farmers in several continental countries by their Governments.

We seem opposed to this course in England, but I doubt whether we have not lost, in the

\* I refer to the schools under the direction of the *Frères de l'Instruction Chrétienne*, and would like to see in England an elementary text book of agriculture, similar to the excellent one used in their schools.

depreciation of some of our agricultural produce, a hundred fold the cost of supplying such skilled instruction.

#### THE KNOWLEDGE WANTED.

I have not attempted to lay down definite or even general rules as to the exact kind of knowledge which the agricultural classes most need. I am of opinion that if the faculties be trained, the means to this end are of secondary importance. That the study of science must occupy a prominent place in the higher education there can be no disputing, and though perhaps personally biassed, there can be little doubt that chemistry and botany will be always of paramount importance.

But putting aside detail, it is evident that those who control the education of the farmer, whether on a School Board, or Secondary Education Board, or Technical Education Committee, should be men who are specially qualified to direct such education.

However, let us assume that a competent committee exists. They will easily determine what technical education will be of most advantage—what it is desirable to teach. But unless their experience should prove different to mine, they will meet at the outset with a very considerable difficulty. They will find that in many cases it is not possible to give this desirable instruction because of the inefficient elementary education which the would-be pupils have received in the past.

Of what avail, then, is it to determine what is desirable technical education, if such education be not possible? Technical instruction is the last stage of education. It must be preceded by efficient elementary and secondary education. To try and graft it on to a stock deficient in these qualifications is useless, and worse than useless, for it brings discredit on what, if properly used, could be of the utmost value, and it wastes money, and time, and effort, which, if properly directed, would be of national advantage.

#### COUNTY COUNCILS AND PRACTICAL TRAINING IN AGRICULTURE.

BY HAROLD E. MOORE.

Until the passing of the Local Taxation Act of 1890 which admitted of financial assistance to a very large extent being given to technical education; but little attention had been given in England to that question in connection with agriculture. Occasionally various Agricultural Societies had promoted

dairy lectures and some had also organised agricultural experiments. With these exceptions, however, the only means of agricultural instruction available in England up to that time were Agricultural Colleges giving complete courses of instruction of a very thorough and scientific character. The oldest established of these colleges is at Cirencester, in Gloucestershire, which was founded in 1845. Its course of instruction extends to practical agriculture, estate management, forestry, agricultural law, building construction, book-keeping, chemistry, geology, botany, zoology, physics, mechanics, mensuration, land surveying, estate engineering, veterinary science, architectural drawing and carpentry work. The instruction in the whole of these subjects extends over a course of two years and the terms must be kept consecutively during that period. At the end of that time satisfactory students on passing the necessary examination receive the diploma of the college. The cost of this two years' training is about £300. Since the establishment of the Cirencester College others of somewhat similar nature have been founded which are also not dependent upon Technical Educational Grants. These include colleges at Aspatria in Cumberland, Downton in Wiltshire, and Hollesley Bay in Suffolk. In addition to these colleges, all of which have farms attached; the University of Cambridge has lately established special agricultural training in connection with Downing College; the University of Edinburgh has similar classes and grants a degree of Bachelor of Science in Agriculture; while at the Yorkshire College in Leeds and at Bangor University there is also special training in the science and practice of agriculture.

A diploma gained through any of these colleges is obviously of great value to young landowners or those who may come to that position and wish to be thoroughly acquainted with the varied questions involved in the treatment of land; to land agents, who must possess a thorough and scientific knowledge; to all those who may be proceeding to take up positions of importance in relation to agriculture in India or the Colonies; and to those who may in the future be wishful of becoming professors in agriculture or in some of its allied sciences. The existence, however, of these colleges can be of but little value to the ordinary class of tenant farmer, for the education given is of too thorough and scientific a character; costs too large a sum; occupies too long a period; and is generally not sufficiently practical.

The importance of providing instruction for tenant farmers, or those who intend to join that class, need not be commented upon by me. It is generally agreed that agriculture is one of the most important industries of this country and it is further admitted that under existing circumstances, nothing but the most advanced and modern methods are likely to give any adequate return for the capital and skill necessary for working land. We thus not unnaturally find that those County Councils vested with large sums to spend upon technical education have been doing something nominally for the instruction of this class. We will discuss whether such expenditure is of a nature likely to produce the results desired; or whether the money expended could not produce better results if more practical considerations were considered.

Prior to the County Councils being invested with the control of the large funds provided by the provisions of the Local Taxation Act, 1890, grants were to some extent given by the Agricultural Department of the Privy Council in order to promote agricultural knowledge. These grants were given to assist dairy institutes in the counties of Buckinghamshire, Cheshire, Leicestershire, Suffolk, and Wiltshire; to defray the costs of agricultural and dairy lectures in various parts; and to assist in carrying on agricultural experiments under the direction of various agricultural societies. The total amounts, however, thus expended over the whole of England, but little exceeded £1,500 a year. The total amount expended for technical education by County Councils, under the provisions of the Act before-named, in accordance with the Government report issued in March last for the preceding financial year exceeded £660,000. It is impossible to state how much of this amount has been expended for professedly agricultural education, the returns included in this Government Report not being sufficiently detailed for this purpose. Every county, however, includes some department of agriculture or horticulture among the subjects given; and the methods adopted seem to have been one or more of the following:—

(a.) *Lectures upon Agriculture.*—These have been extensively given, but in the majority of cases do not seem to have been particularly successful, judging from the attendances that have been reported by Councils who have organised this work. Nor does it seem to me that such lectures extending over a long course, and, perhaps,

only occupying one hour per week, would be of so much benefit to or so readily attended by those younger farmers who would wish to gain the information given, as if the lectures had been given for a longer time and at shorter intervals, the course thus lasting, perhaps, only for two weeks in the place of ten times that time.

(b) *Dairy Instruction.*—This has been thoroughly useful, and has been most practically given, in many different parts, with most beneficial results. It will be recognised by many that the principal feature we have to look to for success in English agriculture, is in the extension of dairy farming on the arable system, and on the most improved principles. Every step, therefore, taken in this direction, may be considered beneficial and worthy of encouragement.

(c) *Agricultural experiments.*—These have been most wisely carried out in many counties, with useful and successful results well worthy of the comparatively small expense. All of the foregoing directions however have involved but comparatively small cost.

(d) *Establishment of Agricultural Colleges.*—Various County Councils have taken this step, at a very large cost. Over £10,500 was provided by two Councils only for one college in the South of England during the financial year, of which the accounts were given in the before-named Government Report. I contend that the greater part of the money expended in this direction has not been spent in such a manner as to give agricultural or horticultural knowledge of the most necessary and practical kind; and the object of my paper is to make certain suggestions as to how the instruction given can be made more practical and useful to a larger number of persons. But before discussing this point I should mention a fifth way in which County Councils have expended funds, viz.:—

(e) *Granting Scholarships.*—These have been given to enable persons to attend colleges either under independent control or those founded by the county. I suggest that in many cases at least, the sum so contributed has been almost valueless, owing to the method adopted for selecting those to be so assisted.

In order to determine the utility of the college instruction it is necessary first to consider what is the class of persons who would be benefited by a higher knowledge of scientific and practical agriculture. These may be considered to be of two classes. First there are young men

of 25 years of age or upwards whose fathers or other relatives are farmers, with whom possibly they have been living all their lives and gradually taking part in the practical operations of the farm with the view of becoming independent tenants. Such persons as these are too frequently ignorant of the scientific principles upon which farming is based; are unacquainted with book-keeping; have perhaps little knowledge of modern farming machinery or new crops; and are only acquainted with the agriculture as pursued in the one district in which they have been brought up. Secondly, there are those who have a desire to take up farming as a business, and who are financially in a position to be able to do so, but who have comparatively little or no practical training in farm work, and who not only want to acquire the knowledge desired by the class I have just named, but should also gain acquaintance with the practical details of work on a farm.

There are large numbers of persons within my experience of both of these classes who are wishful of gaining this necessary and practical knowledge. It is clear, however, that it is necessary that they should gain this knowledge in the shortest possible time, and consequently that the course of instruction given should only extend over those subjects which are essentially necessary and will be of practical value in the management of a farm.

The colleges recently started or subsidised generally attempt the same system as those of the older agricultural colleges named at the commencement of my paper. Thus, to complete the entire course of instruction will occupy a term of not less than two years. In order to see how this two years is spent, I will give the list of subjects in the syllabus of the college I have named as being subsidised by county councils to the extent of £10,500 in a single year. I arrange them under three headings. The first of these would be those necessary to a capable farmer; the subjects named in the second class I contend need not be necessarily studied by those whose time is limited and whose future work in life is solely to manage a certain area of land in the most profitable manner; and the third class are those subjects which can scarcely be considered to be questions upon which farmers need have knowledge.

#### NECESSARY SUBJECTS.

(a) *Practical Agriculture*, including constitution and improvement of soils, labour,

systems of cultivation, theory of rotations, crop culture, seeds and their impurities, injurious insects, manures, grass land, rearing management and diseases of live stock, dairying, poultry keeping, market gardening, and bee keeping; (b) *Agricultural Chemistry*; and (c) *Book-keeping*.

#### SCIENTIFIC SUBJECTS.

(a) *Inorganic and Organic Chemistry*; (b) *Physics and Mechanics*; (c) *Hydrostatics*; (d) *Heat*; (e) *Botany*; (f) *Vertebrate and Invertebrate Zoology*; (g) *Animal Physiology*; (h) *Veterinary Hygiene*; (i) *Meteorology*; and (j) *Geology*.

#### SUBJECTS NOT INCIDENTAL TO FARMING.

(a) *Surveying, Levelling, and Mathematical Instruments*; (b) *Farm Engineering*; (c) *Estate Management*; (d) *Farm Architecture*; (e) *Agricultural Law*; and (f) *Forestry*.

Space prevents printing in full the various departments of the instruction on the scientific subjects, as I have done in the case of practical agriculture. The syllabus of instruction seems, however, to be complete in each subject.

In glancing through this variety of subjects, it is certainly not surprising that the period of instruction extends over two years. Nor in the case of those who desire complete instruction in the whole of the subjects named, do I suggest that a less course than two years would be practicable. No intending farmer, under ordinary circumstances of either of the classes before named, can afford the expense or time of so prolonged a course. To those who wish for that thorough scientific and practical knowledge on all the points above named, and who are prepared to pay the costs of acquiring such knowledge, there are already open those Colleges named at the commencement of my paper. Where, however, county councils are having large grants nominally for the purpose of giving a higher knowledge of farming to intending cultivators, it seems to me unjustifiable to arrange the instruction in such a form as is practically useless to them.

But there are also other objections to this complete work. The inclusion of so much scientific teaching must lessen the attention given to acquirement of practical knowledge. I might mention two cases within my own experience showing that this has been the case. Some time ago I required an assistant to take some part of the control of certain

farms which came temporarily under my management. I selected a gold medallist, and the best student of the year, from one of the leading agricultural colleges. I found that in the direction of farming work, and in dealing with practical questions which arose, he was not nearly so efficient as another assistant whose experience had only been gained from being on an ordinary farm. My second illustration on this point is taken from experience in connection with the Swanley Horticultural College. I had formed the opinion that even here the teaching was too theoretical and scientific, and in order to encourage the consideration of practical questions, I provided certain awards to be offered each term for students in their last year for essays on practical questions. The best of these essays have come into my hands, and though full of ideas, in the opinion of the judges, with which I quite agree, the plans of management suggested for one year's work were financially impossible, and the probable results inaccurately stated.

Then the compulsory inclusion of so much scientific knowledge as a condition of qualification for a diploma which is too frequently insisted upon, may give an inaccurate idea of the knowledge of an unsuccessful student. Thus a man can be experienced both practically and theoretically in all the departments of practical agriculture and agricultural chemistry, but yet may find it difficult to get a knowledge of the abstruse matters involved in ordinary organic and inorganic chemistry; of the varied knowledge required in advanced botany and zoology; and of the scientific terms of geology. Such a student would thus too frequently be unable to secure any diploma from the college in spite of his having an accurate and thorough knowledge of practical and scientific agriculture in all those departments which would be of utility to him.

In order to make the instruction given more useful, practical and available for an ordinary farmer I would suggest additions to the present system of instruction. The colleges as now existing are thoroughly equipped for both scientific and practical instruction and there can be no possible objection to continue the full instruction, as now carried on for the benefit of those younger students, provided they are in a position to defray the costs of this instruction. It must be admitted that the mental training and knowledge given by such courses of scientific instruction must be of value even if they are not practically wanted by those

students in their after-life. In addition, however, to the work being thus continued for the benefit of younger students I suggest that instruction might also be given in the following departments in every case where a farm is worked in connection with the college:—

(a) *Dairy Instruction*.—This to be given either by receiving students for one month upon the farm or by organising travelling working dairies as now to some extent carried on.

(b) *Agriculture*.—A complete course of instruction should be arranged to cover every department of practical agriculture as named in the syllabus before quoted, this course to extend over one term. This term should preferably be arranged to extend over the winter months, this being the time when those who would benefit by such instruction, could best be spared from the actual working of farms where they may be engaged during the active farming months of the year.

(c) *Practical Farm Work*.—This should be a somewhat similar course of instruction, but for a term extending over the summer months only and coupled with more actual work upon the farm itself; being specially adaptable for those intending to take up farming as a business who have not already had actual experience in farm work.

(d) *Special Subjects*.—Then it would be of the greatest value to those who are now farming to have short courses of instruction on various special subjects extending over periods varying from a fortnight to a term. Among such special subjects would be market gardening, horticulture, bee-keeping, poultry rearing, the marketing of farm produce, book-keeping, or some branches of scientific knowledge which the student had a special inclination to study, or which would be of special value in the particular circumstances in which he might be placed.

(e) *Instruction to Labourers*.—At the present time, in spite of the large sums which are expended, but little of the technical education grant is spent in improving the skill and knowledge of the actual workers upon the land otherwise than by lectures. These latter can scarcely be considered effective. I suggest that upon such experimental farms as named courses of instruction should be arranged for our younger and more intelligent labourers. To defray the expenses of such education, and to reward conspicuous merit when it has been proved, seems to me a most desirable method for expending some part of these large sums which are intended to be devoted to agricul-

tural education. At the present time those who are concerned in the management of farms know how extremely difficult it is to get any young men who are efficiently qualified in the various operations of farm work. At the present time there is no inducement for a young man to stop in our villages and to acquire a specially skilful knowledge of the usual manual operations. Moreover, even if there are young men who are anxious to do this, there are no means now available by which they can get the instruction they desire. I cannot therefore, but think that this is one of the most important departments in which our technical education funds might be reasonably used. Moreover, if instruction for this class were organised, in addition to instruction being given as to the best method of the accomplishment of operations required from manual workers upon an ordinary farm, there should also be such instruction given that would fit such men for getting a permanent maintenance upon a small holding. If such instruction could be universally given we should in a short time check to some extent that continual exodus from our rural districts of the younger men which is now so injurious to our national welfare.

Here then are five practical directions in which technical instruction may be of use and at a total expenditure of less than is now incurred. I do not wish to under-rate in any way the value of the work done by the colleges which have been founded in various counties. Nevertheless if in conjunction with the education of those younger persons who now go to these colleges, the work is so extended that the existing teaching staff can also undertake courses of instruction named, there are many hundreds of persons who can beneficially avail themselves of instruction in these departments.

I should moreover point out that in those counties where no recognised college is subsidised, the whole of the instruction named can be given if only an experimental farm be acquired, involving but a comparatively small cost.

But in addition to finding funds for the establishment of such colleges as I have named, many County Councils do at the present time provide scholarships or allowances to enable those receiving the same to become students. The one criticism to which this system is open, arises from the method of selection of those who are to be so helped. In the place of this selection being partially or entirely guided by considerations as to the

capacity or future livelihood of the persons concerned, or their special capacity to become capable farmers, the selection is based upon the results of examinations. These examinations in the place of being upon technical or practical subjects, are solely upon English subjects of an elementary character, and most frequently only open to those of a school age. As a result those entering for the examinations are frequently boys who have no chance of ever securing a livelihood from working the land, but who only enter for these examinations at the wish of their parents, who, upon their success, are thus relieved of expense of any further education for the period for which the scholarship lasts. As a result, I have seen some of the candidates who have been so supported by the County Council grants at the Swanley Horticultural College, and also at colleges elsewhere, who have but little idea of continuing, as a livelihood, the work in which they are getting a training at the expense of the County Council. Moreover, in not a few cases of this kind the interest which the student takes in his work is of a very inefficient kind.

If scholarships are to be given I would suggest that they would be more useful if available for those of more mature age who are anxious to gain special information, and who are not in a position to do so unless assisted by this grant. Such scholarships might even be useful if they were to be expended in sending abroad young men of practical agricultural knowledge, to gain elsewhere particulars of agricultural practice which might not be obtainable in England, and which upon their return they might impart to others.

In conclusion, I might point out that in making these suggestions the work that is being done upon the Continent in relation to practical agricultural education on the methods suggested, might have been mentioned. I might have referred to what I have seen in the practical schools and training farms in Holland; to the agricultural schools in Denmark; to rural education, especially in forestry, as given in Germany; and to the village agricultural schools of Austria. In view, however, of the international character of this Congress, other papers may deal with these points which I therefore do not notice.

I contend that agricultural instruction is necessary, and can be made practically useful by extending instruction in the directions named, and by the formation of further County Council training farms. If, however, some such means cannot be found by which agri-

cultural education may be made more useful and practical than it is at present, then I suggest that the large sums now expended by County Councils, professedly for the benefit of our agriculture, could be used in rate aid, or in other ways more directly assisting our tenant farmers, and those who are dependent for their maintenance upon the cultivation of the soil.

Mr. A. J. BAKER (Leicester), in opening the discussion, said, in reference to Mr. Lloyd's paper, that there were some statements which, in his opinion, as the Secretary for Technical Education for one of the counties, were too sweeping, and the information was not up to date. There were now a score of County Council technical education committees which took a very close and a very active interest in elementary and secondary as well as technical education. With reference to the paragraph which said that the technical education committees engaged "young university men utterly ignorant of both practical farming, and even the results of agricultural experience"—if that meant all technical education committees, it was a most sweeping and untrue statement. Very few engaged young university men, and those who had been engaged were mainly appointed five or six years ago, when the technical committees first came into existence. He would like to suggest that Mr. Lloyd should send out a circular letter to the different technical education offices in the kingdom, asking for up-to-date information on the point. It would be a great pity that such a statement should be published all over the world.

Dr. N. BODINGTON (principal of Yorkshire College, Leeds) said he thought the reader of neither paper had fully appreciated the large amount that was being done for agricultural education in the North of England, especially by means of popular lectures. In Leeds, for the past five or six years, they had had a staff of four lecturers travelling about the three Ridings of Yorkshire and lecturing every evening in the week during the two winter terms, and the lectures were attended by ever-increasing numbers. They had scarcely changed a single lecturer from the very outset, and their lecturers had won the confidence of the farmers to an extent which did not substantiate the observations that had been made, that farmers were indifferent to scientific knowledge. Yorkshire had never taken a backward step. At the present time they were maintaining agricultural and horticultural lecturers; they were working dairy schools and establishing experimental classes; and the money thus spent on agricultural education was being thoroughly well used, and, he believed, it was producing a marked and practical effect on the agriculture of the country. He believed that in Durham and Northumberland the work was also

being carried on with considerable success. If they looked for the causes of that success, he thought it would be found in the fact that they had been careful to appoint men as lecturers who had a practical as well as a theoretical knowledge of the business of farming. Another cause of their success arose from the fact that their lecturers had lost no possible opportunity of bringing themselves personally into relation with the farmers in the district to which they belonged. Wherever it was possible they had gone over the farmers' lands; they had listened to their difficulties and given them suggestions to overcome the difficulties; and thus they had built up a mutual confidence based on personal relations. One point in which they had been less successful was the question of systematic courses of training for farmers' sons. There were probably many causes for that. At present their students went for practical instruction out to certain farms in the district, but it was generally felt that the scheme would never be a complete success until they had a farm of their own. Another point on which Mr. Lloyd had properly laid emphasis was the absence of anything like a complete and co-ordinated scheme of secondary education. But the difficulties of introducing into rural districts a workable scheme of education was much greater than people sometimes supposed. It was difficult to find centres. There had not been any indifference on the part of the Yorkshire County Councils, either to elementary or to secondary education; they had done all they could to relate the different parts of education, but there had been little demand for the scholarships, which had been perfectly freely offered to farmers' sons. One point in Mr. Lloyd's paper he was not in complete sympathy with. It was a matter on which he (the speaker) wanted further light. A great deal had been said about the need of introducing agriculture into elementary education. If all that was meant was that the child's mind should be trained in observation by elementary lessons in science, he cordially agreed with it; but if it was really intended that they were to take children of 12 or 13 years of age, and make them into something of little specialists, if they were really intending to drop out the idea of education for that of "paying knowledge"—knowledge which yielded results—then at present he was not in sympathy with that, and he should be very glad to hear from someone who was in sympathy with Mr. Lloyd what precisely they meant by the introduction of agriculture into elementary education.

Sir EDMUND VERNEY, Bart., said that everybody in Buckinghamshire despised education. He did not know of a single man or woman in Buckinghamshire who had a reputation as an educational specialist, but he could name a great many who were known in the other direction. The two papers were agreed upon the point that elementary education was deplorably deficient. He thought a practical question to ask was: Who is responsible for our elementary educa-

tion? In nine cases out of ten, the man who exercised more influence upon the question of education than any one else was the parson. The agricultural parson deteriorated every year—speaking broadly. He came to the parish with fresh ideas, with some impulses and hopes, but they gradually faded away. The parson rightly held the greatest influence in the parish, and he ought to be the moving spirit, but he felt there would never be any improvement there. Which was the next class responsible for our elementary education? It was the farmers; they were practically controlling the elementary education of the country. What was the feeling of the farmer about education? The Chairman of a School Board in Buckinghamshire, pointing to a labourer, said, "That man knows more than his master, and that won't do for us." Farmers are elected on the School Boards to save the rates, and for no other reason, and many of them were not ashamed to say so; if they said anything else they would not be elected again. That was how they were suffering in Buckinghamshire. How were they to meet it? They could not meet it with the parson; he was past praying for; but they could show the farmers that it was to their (the farmers') interest that the labourer should be educated. What they had to do was to squeeze the farmer up from below, they could not do it from above; they must begin from below and educate the labourers. It was to the pecuniary interest of the farmers that the labourers should know their work. There was no other profession in the world in which they so tried to keep the lower members of the profession down. It would be better for farmers and labourers alike when they could understand the scientific side of their profession of agriculture. The great complaint at the present time was that the labourers were leaving the rural districts. Of course they were, because, as education grows upon them, they begin to see the hopelessness of their future; they see their only chance is to go away. In the towns they found gymnasiums, libraries, and swimming baths. Was it any wonder they left the rural districts when every effort was made to keep them down! Why was not the Public Libraries' Act generally adopted? Where he lived there were four parishes touching each other, in each of which the Public Libraries' Act had been adopted, and there was some chance of the labourer beginning to grow. Another reason for the exodus of the labourer from the country was that technical education had been aimed at the heads of those above him, and very little was given to him. In conclusion, he wished to express his sympathy with what had been said on behalf of the labourer, and he felt it was to the labourer they had to look to save the country from ruin.

Mr. D. T. COWAN (Hampshire County Council), referring to Mr. Lloyd's paper, said he thought it was a thousand pities the writer of the paper did not make himself directly acquainted with the various work that was going on in each county, or else study the various

reports and Blue-books that indirectly bore upon the work. Some very sweeping statements were made in the paper, and these statements covered not only one county, but every county in England. The writer of the paper had said that one reason for the partial failure of agricultural education was the inefficient elementary and secondary education given in the rural districts, and the total inability on the part of the authorities to recognise their mutual dependence. That he thought was a very sweeping statement, especially when one considered the efforts that be believed every County Council in England were now making with regard to this very point. He knew that in Hampshire they were attempting to march abreast of others, and they did consider the correlation of elementary and technical education. There was not a single public secondary school in Hampshire which was not controlled by the County Council, and which did not receive both money and teaching aids from the Council. They also endeavoured to get the secondary schools to take an interest in the elementary schools by offering scholarships and in various other ways. That he thought was evidence that they were able to repudiate that statement in Mr. Lloyd's paper, and that there was an attempt on the part of some County Councils to bring about this desirable object of the correlation of elementary and technical education. Referring to the concluding remarks of Mr. Moore's paper, he would like to point out that one fault lying at the root of much of the indifference in all counties was the fact that the money granted by Parliament never had been fixed for technical education. He believed every county would be much more to the front in the matter of technical education if it were not for the fact that portions of the grant had been and were still taken for the relief of taxation. He maintained that notwithstanding the great hope they had with regard to secondary education, the work would have settled itself down very quickly indeed if they had had this grant tied down years ago for educational purposes. One of the speakers had asked what the feeling of those working in agricultural counties was with regard to agricultural education in the elementary schools. He himself thought it was hopeless to expect agriculture—if by that word was meant the form of agriculture which they were acquainted with at the Science and Art Department—to be taught to the boys in the schools. In standard IV.—the exemption one in most rural schools—it was far too early to attempt to do anything of the kind. But he thought that science applicable to agriculture, such as botany, geology, entomology, and so on, might be introduced into the reading books, the boys might be made to take an interest in the formation of the soil in the district in which they lived, and the teachers in the schools might make that a special subject so as to encourage the boys to know all about their own district. So far he felt convinced that agriculture could not be taught in either elementary schools or continuation schools, except as branches of the subject.



Dr. L. REECE (West Indies) said the West Indies were practically in a state of ruin. The ruin had come about just because of the want of that technical education which Mr. Lloyd and Mr. Moore had been advocating. The natural advantages of the islands are enormous, but nothing has been done to develop them. The old system of education had no connection with life work. Nearly everything a man did in the West Indies was connected with agriculture, and 75 per cent. of the population never had any other career. These colonies were absolutely being lost on account of the system of education that was being carried on there. If they wanted an analyst they generally took a young man from some English university, who had never seen a farm in his life, at any rate, so far as practical knowledge went. If he had to limit himself to making analyses it would be all well and good, but he went among people who knew nothing about science, and the use to whom of half-a-dozen technical terms made them gape in wonder. That young man attempted to teach the farmers new ideas, to teach agricultural science in schools; and the result was ruin. Practical instruction is the very life of the farmer, and of all who derive their maintenance from the farm. In purely agricultural communities, like the West Indies, a vast deal depends on the success of farming operations, and, so far as this subject is concerned, on the education of the farmer, who controls the chief source of national wealth and the prime necessities of life. This is why he had always advocated self-supporting demonstrative farms, under the direction of practical agriculturists in place of the usual experimental ones under the control of experts (theorists), as the best means of teaching what is known, and of supplying by object-lessons, technical instruction to those engaged in cultivating the soil. Let the value of the expert as guide be tested by the same standard that is applied to the pupil (farmer), who is asked to adopt his methods and ideas, viz., practical financial success. All education is the process of growth that accompanies normal occupation. Such education begins normally in contact with nature—observation preceding reflection—the concrete technical education cannot but fail as to its object so long as:—1. Elementary schools turn out pupils by a system of modelling, and crush out all individuality; 2. Teachers in technical schools are above playing the role of assistants (not masters) to pupils. The elementary education of the schools was not at all adapted for building upon it this higher education. They could not build anything upon education; education was a growth, and they must have the roots and stem, and leaves, and fruits. It was nonsense to talk of teaching one thing in one school and one in another. Whether in England or elsewhere agriculture was the industry which was at the basis of national greatness. And he hoped that the men of influence in the room would so impress the value of these two papers on the Colonial Secretary, that

he would do something for education in the West Indies, and thus save them from poverty.

Mr. T. S. DYMOND wished to say one thing about secondary education in agriculture, and that was with regard to teaching farmers agricultural chemistry. He felt it was an extremely important subject, because the application of artificial manures was not the result of centuries of experience, and therefore farmers frequently felt the need of instruction in the science of agricultural chemistry. Now, some of the farmers in Essex, with which his work was connected, had been through a course of chemistry at the agricultural schools, and he was bound to say when he met those farmers afterwards he found their chemical education had done them little good. They were distinguished from those who had not studied chemistry by occasionally asking for a symbol or a formula, as if that was the end and object of all chemical teaching. What was wanted was not such a course as that laid down by the Science and Art Department, but a thoroughly practical course—a course especially dealing with the chemistry of bases, acids and salts, as applied to manures, and their effects upon the soil. A year's practical course of that sort, if properly worked out, would do more good than the lengthy courses which were now given in some of the secondary schools and agricultural colleges. Consequently, he would like to point out, in cases where schools were helped by grants from the County Council, that he did not believe those grants—so far as chemical education went at present—were always doing very much good.

Rev. R. C. FLETCHER (Lancashire County Council) said he did not propose to say anything upon the subject of Elementary Education, for the lamentable position of which in Buckinghamshire Sir Edmund Verney laid so much blame upon the parson; but he was rather pleased to hear that when the parson came into Buckinghamshire he came full of enthusiasm, so that it must have been the influence of the Buckinghamshire people that caused that enthusiasm to evaporate. His object in rising was rather to put before them the work which was being done in the county of Lancashire. He had had the privilege of being a member of the County Council and the Technical Instruction Committee since its formation, and was in a position to tell them something of the work carried on in Lancashire. Lancashire was generally known as a great manufacturing centre, but it was not always realised that it was also a great agricultural county. The amount of work done there for technical instruction in agriculture would compare favourably with that of any in the kingdom. Allocations of money were made by the County Council to the different districts. The district he represented contained sixteen townships, and received £490 a year. That money was expended upon lectures and instruction given chiefly in the schools in the various villages. But if that was all they did for

agriculture, they would think it very little. They had other departments besides. The first was the County Agricultural School, which was held at the Harris Institute at Preston. The Harris Institute was established as a Science, Art, and Technical School many years ago, and was very liberally endowed by a gentleman who was long since dead. When the County Council took up agricultural instruction, the Harris Institute Council was approached, and consented to unite with the County Council in establishing an Agricultural School, and to utilise for this purpose the rooms of their institute and such lecturers and teachers as they had who were able to give the kind of instruction they wanted. Their next step was to get students, and with that view the County Council made an offer to the public at large, and especially to farmers and their sons, that any persons who desired to receive agricultural instruction, might come and attend at the Harris Institute for that purpose without paying any fee whatsoever. Not only that, but the County Council would pay the travelling expenses of such students; or, if they lived too far off to travel into Preston every day, they might lodge in Preston, and the County Council would make them a grant of 10s. a week to pay for their lodgings. At the present time they had fifty students in residence, and they were taught agriculture, mechanics, steam, chemistry, land surveying, veterinary science, book-keeping, and other subjects which were thought likely to be useful to them in their work as agriculturists. But the work of the lecture-room must be supplemented as far as possible by practical work on the land. Feeling that to be the case, the County Council became the tenants of a farm situated about four miles from Preston—a very good farm of about 170 acres, with model buildings upon it, and everything necessary to give a favourable start to the undertaking. They had somewhat added to the buildings, purchased a fine head of dairy cattle, and established a dairy school, with steam-power and skilled teachers, and they now offered eight weeks instruction free of charge to the daughters of farmers. During the eight weeks they were boarded and lodged free of expense, and received instruction in butter-making and cheese-making on the most approved principles, and they also had lectures on the chemistry of milk and the scientific part of dairy work. At the farm they had experimental plots for the testing of seeds and manures, in addition to the ordinary growing of crops, also a special department for poultry where they practised not only the ordinary feeding and breeding of poultry, but also incubation, cramming, and everything else they could. Cramming was a most disgusting operation, but when publicly exhibited it was always watched with great interest by the public, and he believed it was a profitable operation. From time to time, the students from the Harris Institute were taken to the

farm in order that they might see the practical operations that were carried out on the land. They also had a scheme of scholarships, and amongst these were three agricultural scholarships, offered every year and tenable for three years, of £60 per annum. These were not carried off by children. One of the first to win one was a man who had been for a year or two at the Harris Institute, but who, previous to that, had been a tenant farmer, and who was a married man with a family. He had since used his scholarship at Edinburgh, and was this month taking his degree there. In addition to what he had already told them, they employed lecturers to perambulate the county and address the public on various subjects connected with agriculture—poultry, bee-keeping, diseases of cattle, and so forth. Practical courses of instruction in butter-making and cheese-making were also given by skilled teachers at the cost of the country in any district that applied for them. They also encouraged practical experiments with regard to the potato crops and other matters, and the results were tabulated for the benefit of the farming community. Speaking for his own neighbourhood, he was able to say that though there was a very considerable emigration of the rural population into the towns, it did not take place owing to an inordinate love of baths (hot, cold, and swimming), public libraries, and gymnasiums; the whole question of the emigration of the farm labourer, so far as he knew it, was simply a question of wages. In the country districts the farm labourer was half his time out of work. Rain came, and he was told, "You will not be wanted to-day," or there was a spell of frost, and he was told, "You will not be wanted during the frost." Consequently, the wages, which were always low, became less, and the man, in search of wages, left the country which he loved and went into the town which he abhorred.

Right Hon. Sir RICHARD PAGET said he had been more or less associated with all the earlier developments of the agricultural industry in regard to dairy work, and it was a matter of satisfaction to him to hear from various parts of the room evidence and testimony of the good work that was being done in different parts of England. The gentlemen who had spoken were mostly engaged in the work of technical education. Money had been placed at the disposal of County Councils, and this had produced a race of men not known before—those who were known as directors of technical education. But where were the farmers, the very men it was their business to teach? They were not there! True, the younger class of farmers were taking much more notice of scientific matters, but, still, it was a lamentable fact that the movement proceeded in a slow and sluggish manner, and it was because those whom they wished to benefit were slow to appreciate the benefits offered to them. He had listened to Mr. Lloyd's paper with the greatest interest. No one had a better right to be heard on the subject than Mr. Lloyd; he not only

commanded respect on account of his scientific knowledge and acquirements, but he (the speaker) could speak in the highest terms of the ability which Mr. Lloyd displayed in the original research which he had conducted with such excellent advantage to the great industry of cheesemaking. They had had a discussion on elementary schools, which had not much to do with the subject before them, but so far as it might lead to children being taught certain elementary facts and natural results it might be beneficial. He was not for one moment suggesting that they should turn little children into specialists. No one in his senses would ever attempt to do that, but something ought to be done. It seemed difficult to make any advance, and one of the difficulties arose from the fact that teachers were too much in the habit of looking to what was to them a necessity—would it pay? This was one of the things that required alteration, but it was by no means the only one. "I have come to the conclusion," said Mr. Lloyd, "that the elementary and secondary education given in rural districts has been disgracefully inefficient." The language was strong, but he (the speaker) was not prepared to say it was too strong. Mr. Lloyd had been actually engaged not only in the scientific, but also in the actual work of cheese making, and was in a position to form a very good opinion as to the true state of elementary and secondary education at the present moment.

Mr. H. MACAN said he felt it was his duty to controvert what Mr. Moore said. He believed in the whole course of his experience in educational matters he had never come across anything more deplorable than the final sentence of Mr. Moore's paper. Because a man differed from you upon the particular methods of teaching, because the style of teaching he adopted was not the same as yours, it gave him no right to make such statements. Whenever they entered the field of agriculture there always appeared to be certain persons who were anxious—he only knew one way of expressing it—to play to the gallery of the farmers by saying, what was the one popular thing with them, namely, "take education money" to relieve the rates. It would ill become him to make any comments on the paper of Mr. Lloyd, who was a distinguished authority on scientific subjects more particularly connected with agriculture. Mr. Lloyd had conferred immense benefits on the counties of Somerset and Devon, and his opinion on these matters would always carry the greatest weight, but Mr. Moore had not only gone out of his way to make the assertion alluded to, but the whole of his paper was a libel upon the work of the County Council. He was glad to hear from other speakers what had been done in certain quarters. Mr. Moore did not even know his facts, for in his paper he made this remark: "It is impossible to state how much of this amount (£660,000) has been expended for professedly agricultural education, the returns not being sufficiently detailed for this purpose." He

(the speaker) could only say if Mr. Moore would undertake to spend a few hours in his company at 14, Dean's-yard he would be glad to give him that information. Mr. Moore went farther. In the earlier part of his paper he mentioned in a casual way some two or three educational institutions which had been started by County Councils, but he did not give the results of the institutions in Lancashire mentioned by Mr. Fletcher; he did not tell them anything about the work carried on in Reading; the work which was being carried out in the excellent farm established by the Cheshire County Council he did not even mention, nor did he mention the work carried out by the Sussex County Council at Uckfield; he said nothing about the Ashburton Agricultural School, or the new agricultural institution started by the County Councils in Cumberland and Westmoreland; he told them nothing about the work done by the Durham College of Science or the Yorkshire College lads, or the school with which Mr. Dymond was connected at Chelmsford; nor did he speak of the work which was being carried on in connection with cheese and dairy work in Somersetshire. Practically the whole of the important work which was being carried out by the County Councils was not even mentioned in Mr. Moore's paper. But Mr. Moore went out of his way to allude to a certain institution with which he (the speaker) was connected, but which he (Mr. Moore) did not mention by name, when he spoke of an agricultural college started by the County Council which cost £10,500. As a matter of fact it cost nearly £30,000, and it also cost £4,000 a year to maintain. But that was absolutely nothing compared with what their foreign friends would tell them was being spent on the Continent. The Duke of Devonshire said it was the proper institution for farmers to attend, the Board of Agriculture had voted them £150 and were raising it to £400, the Royal Agricultural Society gave its gold medal to one of their students, and yet Mr. Moore, told them the money which was spent upon it was wasted.

Mr. JAMES MASON said in Worcestershire their teachers of agriculture were not professors of colleges, but practical men. Poultry keeping was taught by a practical farmer who had made a special line of poultry; veterinary science was taught by a qualified veterinary surgeon in practice; the principles of agriculture were taught by a working tenant farmer; their cider making teacher was a man who went into the orchards and was present when the cider makers were making cider and perry; and butter making was taught by a practical dairymaid. With regard to the formation of more agricultural colleges and farms, he thought there was already a sufficient number, because the probability was that if the number were increased there would be a decrease in efficiency. The Worcestershire County Council did not propose to establish a farm, because they had numerous farms around them which they could select for special

purposes. They also intended to utilise the farms already established by County Councils. They in Worcestershire were not giving theoretical instruction by theoretical persons, but were giving practical instruction by practical men. He might add, as an illustration of the practical value of the instruction, that a farmer formerly sent apples to market for which he obtained 30s., but, acting on the advice of the cider-making instructor, he made from the same orchard cider which realised £25.

Mr. J. SMITH HILL (principal, Aspatria Agricultural College) wished to add his testimony to the excellent work which the directors of technical instruction throughout the country were doing. Mr. Moore in his paper made reference to young men going to colleges "who are too frequently ignorant of the scientific principles upon which farming is based; who are unacquainted with book-keeping; have perhaps little knowledge of modern farming machines or new crops; and are only acquainted with the agriculture as pursued in the one district in which they have been brought up." He wished to bear testimony in the cases of students from Cumberland and Westmoreland, those who had received their education in the elementary schools and gained scholarships offered by the County Council, who did arrange for the "educational ladder" which Mr. Lloyd spoke of as wanting. He had been struck with the keen appetite for instruction with which such students, who had been selected by the directors of technical education, had come to the college,—some of whom he was going to say were hardly able to write their names, because since they left the elementary schools they had been engaged for five or six years in hard manual work on the farm—and who devoted themselves with the greatest enthusiasm to acquiring some of the technical knowledge connected with their work. It had given him, as a teacher, interest and encouragement in his work to see the way in which these young farmers benefited by the instruction which was now offered to them, and that they were able after so short a time to go and be a centre of light in their own district, spreading the information which they had gained, and which in time must benefit the whole of the community. He was speaking from close contact with young men who came from elementary and secondary schools by means of the scholarships established by the County Council, and he must bear record to the way in which the education was organised, and that agricultural labourers' and farmers' sons were able easily to obtain technical instruction. He would like to take exception to the statement made to the effect that some of these young men who gained these scholarships did not follow agriculture. His experience was to the opposite effect. The majority of those whom he met were now engaged in agriculture, and had not taken the agriculture scholarship simply to save their parents the expense of educating them for

other occupations. Another remark of Mr. Moore's to which he took exception, and which did not do justice to agricultural colleges, was the following:—"I selected a gold medallist, and the best student of the year, from one of the leading agricultural colleges. I found that in the direction of farming work, and in dealing with practical questions which arose, he was not nearly so efficient as another assistant whose experience had only been gained from being on an ordinary farm." He (the speaker) thought it was probable that the medallist was only a young man, and had been selected soon after obtaining the medal, and he did not think it fair to the colleges—if his interpretation of his age was correct—that such a young man, because he had had technical instruction in the principles of his art at a college, should be expected to be able to manage at once all the practical details of a farm, and it was not fair at such a time to compare him with another assistant, who had perhaps gained his experience through many years. A speaker had referred to some of the courses at the agricultural colleges being too long. Two years was about the limit of time to which the courses could be extended, and he believed those who were engaged in teaching would bear him out when he said that the general course was not too long; sometimes they as teachers felt they should like an extension of the time. He hoped the time would come when technical education would be organised so well by the directors of education throughout the country that it would be the rule for every farmer's and every labourer's son to have the opportunity of passing a short time, after his general education was over, at an institution at which he would receive technical instruction in agriculture.

Mr. J. WHITEHOUSE GRIFFIN said he was a practical farmer from Buckinghamshire, and one of the greatest obstacles to teaching technical education in any form the County Councils had to contend with was the uncertainty of the grant. It depended entirely upon the vote of each County Council, and every new County Council that came into office might decide to make some other use of the money. If it was laid down by the Government once and for ever that the money was to be inalienable from technical education, they would know how to deal with it. With regard to secondary education, the great obstacle they had to contend with in the country was to find suitable centres. The old grammar schools ought to be the centres in the country districts for carrying on secondary education, but he was sorry to say the trustees of those endowed grammar schools and the Charity Commissioners did not respond to their offers as they ought to do, and gave them no aid either in agricultural education, or technical education generally, except, perhaps, that they started a school of chemistry, but chemistry alone was of no use to agriculture. If chemistry was to be taught, it ought to be applied chemistry, and it ought to be carried out by practical object lessons. Although it had been

laid down that they were not to touch upon elementary education, he should like to say that the reason that elementary education, as now constituted in the Code, was of very little service to the agricultural labouring classes, was that the teachers themselves knew little or nothing about agriculture. They did not know how to teach it; they required better agricultural teaching in the training colleges to enable them to teach the rudiments of this subject. Another reason was that it did not pay. Drawing was another subject that did not pay well, and was not therefore much in favour. He felt that if they could get the elementary teachers to start with the boys attending the elementary schools, it would give a greater encouragement to those who endeavoured to teach the labourer how to deal with his allotment to the best advantage. The knowledge obtained in the elementary schools would enable them to be more successful with their County Council allotment schemes. In the county he represented they had been very successful in giving instruction in the cultivation of allotments, but he could not help feeling that they were far behind other countries, and he wished they could have such information sent by the Board of Agriculture and other Government boards to the County Councils, as would assist them in this great work.

Mr. Alderman H. BLUNDELL (chairman, Bedfordshire Technical Education Committee) said they had founded a technical agricultural school and farm in Bedfordshire, and he thought it would interest the meeting if he gave them a statement of one or two points connected with the working of the institution. He believed that this question of technical education, and the further development of anything connected with agriculture, was growing very much more than appeared on the surface. As an instance he cited the case of a man whom he knew in his younger days as the village blacksmith, who afterwards became a farmer in a village in Bedfordshire and took to dairying. His daughter, knowing nothing about cheese-making, left her home and found a situation in a dairy in Gloucestershire in order to learn cheese-making, and having accomplished her object she returned to Bedfordshire, and now every year some eight or ten tons of cheese were turned out from that small farm. He thought that instance showed that there was a greater and wider interest taken in agriculture and dairy work than people sometimes thought. His Grace the Duke of Bedford had placed at the services of the technical instruction committee a farm of 274 acres, he had also built them a very admirable dining-room, a school-room, and dormitories for the students. They had made an arrangement whereby the County Council took 20 boys who had passed through the evening classes in the elementary schools of the villages, and who had been instructed by masters who had themselves some knowledge of agriculture. These boys had usually passed the fifth standard, and were from 16 to 18

years of age. They spent two years on the farm, and received board and residence, together with instruction. They did not find the students in clothes, but they gave them as rewards a small amount of wages every week, but money was subject to fines which were imposed in cases of abuse of the rules. There was a farm master who managed the whole of the farm work, a resident dairy mistress, with an admirable dairy provided by the Duke, and there was also a house-master and matron. The house-master took the boys in school every alternate day, and everything connected with the work of this farm of 274 acres was done by the 20 boys; only two or three labourers were employed besides. The teaching in the school had all to do with the necessary knowledge connected with agriculture. For instance, in their arithmetic and mensuration, everything was brought to bear upon what would be of use in the practical work in connection with the calculations necessary in farming and land measuring. They were also taught botany, the geology of the district, animal physiology, and any other subject likely to be of use to them in their practical work, and were subjected to an examination every year. The boys maintained the dairy under the guidance of the dairy-mistress. They had to do the milking; they weighed the milk, and kept a register for each cow. The making of butter and cheese, even the cleaning of the dairy, in fact, everything connected with the work of the dairy the boys did under the supervision of the dairy-mistress. They were also taught the management of poultry, and were privileged to witness the operation of "cramming." The committee tried to introduce on the farm everything connected with the work of practical farming, even to bee-keeping and market gardening. The Farm School had only been established two years, and there would be ten boys leaving in October, and if there were any gentlemen farmers present who wanted some really practically turned out farmers he could strongly recommend the same.

Mr. MAURICE JACOBS observed that his object in rising was to say a few words for Buckinghamshire. He was anxious to do so because, although now connected with Bucks., he originally came from Sheffield. He had been connected with education all his life, but not with technical education; and he took great interest in the subject because he had worked his way up the educational ladder at a time before it was made as complete as it was now. He was invited to join the Mid-Bucks. County Council Technical Education Board, and he found on it many men who, if they were not eminent specialists, were at least gifted with energy, enthusiasm, and sound common sense, and even in apathetic Bucks considerable good had been done—much more than could have been expected. In a small village, Waddesdon, for example, having a population of 1,600, a course of lectures was given on poultry-rearing; the first lecture was attended by 142 people, and the second by

170. That, he thought, was a hopeful symptom. and showed that their work was appreciated. The parsons in the neighbourhood which he represented, at all events, were always giving them help on their local committees; they had never been a hindrance, but had always been of the greatest benefit. His evidence was perhaps worth all the more on this point because he was not a member of the Church of England, but a Jew. And he could safely say that they could always look forward to the clergy to help them in educational matters. Many agricultural labourers had told him that they were satisfied with their allotments, and felt they had a new object in life. The help the County Council Educational Board had given had done something to make the life of the agricultural labourer a happier one. He hoped the time would come when they would get swimming baths. His divisional Board were hoping at an early date to establish a domestic economy and a farming institute, and he hoped Sir Edmund Verney would persuade his division to co-operate.

Mr. R. P. WARD wished to make a few remarks on one part of the subject that had not received that amount of attention which its importance deserved—the teaching of dairy work. He came from Cheshire, a place which was perhaps rather noted for its dairy industry, and which had a County Council that had from the commencement devoted the whole of the money at its command to the purposes of technical instruction. In regard to instruction in dairy work, they had had peripatetic lecturers and formed classes in various parts of the county, and he believed they were the first to establish a fixed dairy institute, where students could be taken for some considerable length of time and given a thorough course of instruction, both theoretical and practical, in butter and cheese making, and they had come to the conclusion that peripatetic lecturers were very good to arouse interest, but that you could not get any very full instruction, particularly in regard to cheese making, in a short course of lectures; that if students were to get any really thorough instruction in cheesemaking, it was absolutely necessary that they should attend some place where the whole of their time could be devoted to the subject, both practical and theoretical, and that the courses should extend over some considerable length of time. Each year they became more and more impressed with the importance of the necessity of that, and at the present time, the committee that had charge of that particular duty laid it down that every person to whom they granted scholarships should stay at the institute at least ten weeks, and they did not allow anyone to enter for the examination unless they had attended that length of time. They experienced no difficulty in getting plenty of students into their institute. They had accommodation for sixteen or seventeen students, and the average attendance for the year had been eighteen or nineteen, they being often obliged to get accommodation outside. During the past year, out of the 75 who

passed through the institute, 45 stayed for the maximum period; and three or four were so impressed with the benefits to be derived from the course that they entered for another course, and paid for it. The average attendance was eight weeks. They also tried to get farmers' wives and others to come for short periods of three or four days, or a week. In the case of a farmer's wife who was already a dairy-maid, who came to get specific instruction on some particular point, a few days' instruction was very useful. Some remarks had been made in one of the papers that the persons who took advantage of these institutions were people who were well-to-do. That was not true so far as the county he represented was concerned. Among their scholarship-holders were a great number who were daughters of agricultural labourers. A course of instruction was also provided in order to train advanced students for becoming teachers if they desired. They further kept a record of all those who came to the institute and wished to go out as dairymaids, and they never recommended such unless they were perfectly satisfied with their work and conduct as students. The demand for the students as dairy-maids, or managers of dairies, was quite equal to the number they could supply. The majority of the students being farmers' daughters went away to improve the dairy products on their parents' farms.

Mr. LLOYD, in reply to the criticisms passed on his paper, said there was the highest authority for saying that those who are whole need not a physician. The people who had attended the Conference were the healthy ones, and they objected to the medicine he intended for the unhealthy ones. He was glad to hear that there was healthy and good work being done in some parts of the country, but they must not forget that if good work had been done under some Councils that did not represent the whole of England. When he was asked to read a paper he felt that it was impossible for him in twenty minutes to say one-tenth of what he wished to say, and he determined to be like the fisher, who stood by the stream, and threw a fly, which he had constructed as well as he could, in order that he might cause the biggest fish in the stream to rise. He felt he had succeeded in his object, and they must excuse him if he thought it necessary in making that fly to ensure that it was attached to a sharp hook.

Mr. MOORE, in replying, said, in reference to the remarks of Mr. Macan, that the figures quoted in his paper were from the Government Report issued only last March. Mr. Macan had suggested that he had ignored all that had been done, but the fact was that he found so much had been attempted that it would have been impossible for him to have mentioned all this work in his paper, and consequently he made no reference to it beyond stating the fact that in every county something had been attempted in the direction of agricultural instruction. He knew

something of all those efforts Mr. Macan had mentioned, he was thoroughly acquainted with the work at Reading, he knew what was being done at Uckfield and the other places mentioned by Mr. Macan, but there were other institutes which had been even more successful and more practical. Mr. Macan had seemed to miss the real purpose of his paper, which was to make suggestions by which the instruction given could be made more beneficial to farmers than it was at the present time in numerous cases, where scientific teaching was alone attempted with funds supposed to be used for agricultural training. How successful such suggestions could be, if carried out, was shown by the representatives from Lancashire and Bedfordshire. In both cases the suggestions contained in his paper were stated to be there in operation. He therefore thought that instead of thinking their plans were perfect, it would be wiser on the part of some County Councils to consider the suggestions made, and see if their institutions could not be made more valuable and more practical by the adoption of some of them.

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### WEDNESDAY AFTERNOON, 16TH JUNE.

#### SECTION B.

Mr. JOHN WALTER SUGG, Master of the Clothworkers' Company, in the chair.

### HOW BEST TO ENCOURAGE TECHNICAL EDUCATION AMONG THE WORKMEN.

BY R. W. BAXTER,

Teacher of Lithographic Drawing at the Bolt-court Technical School, London.

Before we can determine the best means of encouraging technical education among the workmen, it is necessary to be fully acquainted with the feelings of the men themselves in regard to it. Being myself actually engaged as a lithographic artist in a printing-office, and as an instructor of lithographic drawing at a technical school, I claim to speak with some experience on the subject, and the impressions I have thus gathered I will endeavour to set forth in this paper.

Ten years ago, the attitude of workmen towards technical schools was positively hostile, but happily this feeling has almost disappeared, and it is gratifying to know that at the present time it is much more favourable, notably in London. This is principally owing to the wise administration of the Technical Education Board of the London County Council; but, taking the country as a whole, it would be folly to assume that all prejudices have been removed.

In the first place, there is still a fear among some that technical schools will overstock the trade with workmen, consequently bringing down wages and increasing the unemployed, a feeling possessed by unionists and non-unionists alike, and which manifested itself very forcibly at a conference of the book, paper, and printing trades, held at the County-hall, Spring-gardens, on July 4th, 1894. I shall not attempt here to either justify or confute this objection; it is enough to know that the existence of this feeling is an obstacle to technical education and, as such, must be removed. I believe the conference referred to above, did much to confirm the opinion already held by many friends of technical education; at any rate, the London Board have shown by their action that they fully realise the existence of this feeling by stipulating that only those actually engaged in the trade shall receive instruction in any of the schools subsidised by them; and, furthermore, they have co-operated with the workmen themselves in the management of their own trade schools.

The Bolt-court Guild and Technical School of lithographic drawing, designing, and photo-process engraving, is managed by a committee elected by, and from, the National Society of Lithographic Artists, and representatives of the Technical Education Board of the London County Council. The policy adopted by this committee is that only those who are engaged in the printing and photographic trades are admitted to the school. Instruction is given to boys who are going to be apprenticed, but the committee decide what time shall elapse before apprenticeship. This policy of restriction has done much to gain the confidence of all in the lithographic and photo-process trades, with the result that the attendance at the Bolt Court school, amounts to about one-fifth of the entire number in the lithographic drawing, designing, and photo-engraving trade in London, a percentage, of which few other trades can boast, either in or out of London.

Secondly, there is a want of confidence in the efficiency of the teachers and in the practical character of the teaching in technical schools. The prevailing idea is that the instruction given is "too theoretical." This difficulty can be surmounted (as it has been in London) by administrative bodies taking workmen's organisations into their confidence.

A committee composed of the chosen repre-

sentatives of a trade organisation, and elected because they are known in the trade as competent men, must be in a better position to know whether the instruction being given at the school is useful and up-to-date, than a committee composed of estimable gentlemen who know nothing about the technicalities of the trade, but are simply patrons of the institution : one or two employers who, as a rule, know very little more; and perhaps a professor or two. I know for a fact, that committees of this description have been bitterly disappointed in their choice of teachers, as they are completely at the mercy of any charlatan who comes along. This cannot happen, to the same extent, to a committee of practical men, as their knowledge of the trade enables them to ascertain the capabilities of applicants with very little trouble.

In all cases where purely technical work is taught, the teachers should be practical workmen, in constant touch with every new development of their branch of the work. All classes where the work needs artistic skill should be under the general supervision of an art master. All classes where the work needs scientific knowledge should be under the general supervision of a science master. This would insure the work being kept up to a high intellectual standard, and would be the best method of combining sound instruction in artistic and scientific principles with the best practical training. That there is some difficulty in finding workmen with the capacity for teaching, I will admit. Nevertheless, such men have, and can be found, and there is no doubt that when technical education becomes a *sine quâ non* this difficulty will disappear.

In the lithographic and photo-engraving trades, improvements in the manipulation of the work are constantly being made by the workmen themselves. These improvements are often a long time before they become generally known, and consequently it is only the few who are benefited thereby. It is the duty of the teaching staff, to be constantly on the lookout for every new method of work, and to make the trade school a "university of the crafts." If this could be once achieved, we should hear no more of the teaching being "too theoretical."

Before apprentices can avail themselves fully of the facilities provided for them, some arrangement will have to be made with their employers, to allow them to leave business for at least two half-days a week, to attend the schools. Say an apprentice leaves business at

6.30 in the evening, and attends class twice a week for two hours; should they attend regularly for twelve weeks, they have only accomplished about a week's work. One day a week at least should be one of the conditions in every lad's indentures of apprenticeship, and committees of schools should be constantly pushing the point.

Finally, I should advise :—

1. That all technical education boards and like bodies, should negotiate with the trade organisations with a view to co-operation.
2. That all teachers of technical classes should be practical craftsmen.
3. That all classes should be under the supervision of professors of either art or science.
4. That strenuous efforts should be made to obtain more time for young apprentices to study at technical schools.

Could these suggestions be accomplished, I honestly believe that technical education would receive the united support of the community, without which it can never be that benefit to the nation which we so much desire.

#### TECHNICAL EDUCATION IN RELATION TO THE ELECTROTYPING, STEREOTYPING, AND PROCESS ENGRAVING INDUSTRIES.

BY WALTER BOUTALL,

Chairman of the Electrotypers', Stereotypers', Process and General Engravers' Association.

In reviewing the present position of technical education in connection with these industries, we are confronted with difficulties due to the want of anything like adequate organisation prevalent in the trades themselves. Until quite recently no Association existed which was entitled to speak with any approach to authority on behalf of the trades, and indeed their precise relationship to each other or to the more important industries with which they were allied was not clearly defined. Consequently, although the need for improved methods of workmanship, for stricter training of the operative, and for a general improvement in the standard of execution was felt among those mostly interested, there was no agency in existence for initiating any movement designed to improve the few facilities available for instruction and technical training in connection with the trades in this country. In this



respect the process engravers are not now so badly situated as their colleagues the stereotypers and electrotypers, for in the absence of any trade organisation, the Technical Education Board of the London County Council has directly dealt with the question.

Much attention has been given to the various applications of electricity within recent years, and the production of electrotype plates for printing purposes has been considerably improved, but even now much is left to be desired. The stages leading up to the preparation of the mould, the production of the "shell," and the processes of finishing are all of them performed in an antiquated fashion. There is no real reason for this condition of affairs except the absence of a properly co-ordinated scheme of technical training. For want of properly trained workmen, advantage cannot altogether be taken in this country of methods and processes which prevail in the United States and elsewhere abroad, and the finish of printing electrotypes manufactured either in the United States or in some parts of the Continent, notably South Germany and Austria, is conspicuously superior to anything produced here. What is wanted is to train the English workman up to, at least, the level of the American standard. For the purpose of securing this result I think it will be desirable to establish properly graded courses of instruction, and if possible in connection with some recognised centre where special attention is given to the subject of typography. Such courses should include, as a preliminary, an elementary study of theoretical physics, the electricity stage being specially prepared with a view to the subsequent practical work; and later on a short course of applied mechanics; a period of practice in the use of machine tools with some knowledge of the construction of the more simple tools. I believe such a course would be appreciated by the men, and the knowledge that such technical training is available would confer an additional benefit upon the industry also, by attracting to the ranks of the workers in it, youths possessing the necessary qualifications, but who, at present, are hardly aware of the scope which it allows for the development of any special aptitude they may exhibit for the occupation.

No existing syllabus fulfils these conditions, the nearest approach is perhaps to be found at the Finsbury Technical College, but so far as I can ascertain, very few journeymen or apprentices have ever availed themselves of the teaching there; it was not sufficiently specific.

Candidates for the Honours stage in Typography at the City and Guilds of London Institute examinations are required to possess a general knowledge of the subjects of electrotyping and stereotyping, but no intimate acquaintance is pre-supposed with the details, nor is it necessary in the case of typographical candidates. Such papers constitute at present the only recognition of these subjects in any series of technical or technological examinations.

With regard to process work there is quite a different story to tell. In comparison with its age, probably no craft is at the present time so well provided with facilities for efficient technical instruction—at any rate so far as London is concerned. The numerous processes of engraving which are founded upon photography have all been introduced into this country within the last twenty-five years. For the first half of that period no substantial progress was made and the productions of English process workers compared unfavourably with those obtained abroad. The methods which involved a combination of lithography with pure photographic operations (such as collotype) were relegated to comparative obscurity—those which were capable of being used in conjunction with letterpress printing might, for their intrinsic merits, have shared the same fate but that a combination of circumstances compelled development. The two most important factors in determining this development were the great increase in the number of illustrated newspapers and magazines and the rapid spread of a general interest in and pursuit of photography as a pastime. The earliest workers in these letterpress printing processes were mostly French refugees who found an asylum here after the political troubles of 1871. These men in turn were set to train youths who were employed without any reference whatever to their aptitude for the somewhat delicate operations they were to perform. There was no selection, no recognised system of apprenticeship, no particular inducement was offered to the workman to efficiently teach his assistants, and in the result a number of workmen were engaged in the trade who had a rule-of-thumb method of working, but who had no acquaintance with the principles upon which the various stages of their work rested, and who consequently carried their performances to a certain level, but were unable to get beyond. To these succeeded a rather superior class, men who had been through a course in photography, at some one of the Polytechnics where the

subject was taken, and so possessed the rudiments of a technical training. With the introduction of the more elaborate half-tone processes which were to supplement, and which are bidding fair to altogether supplant the old line processes, the need for more highly organised and more completely specialised training became pressing. While in the main one general idea was followed, in detail a very varied practice prevailed. Consequently much confusion arose whenever an alteration occurred in the *personnel* of the staff. A newcomer had probably been trained under different conditions and the employer frequently had to choose between preserving the traditional practice of his workshop, or adopting the innovations suggested by a more or less varied experience elsewhere. No test could be applied and the value of an innovation could be determined only by the result.

The rapidity with which the importance of the industry had grown, and the fact that many of the institutions which had originally devoted some portion of their energies to the fostering of a really efficient technical instruction in photography had found in course of time that their efforts were, from lack of pure directness of purpose, calculated only to encourage the amateur, induced the Technical Education Board of the London County Council to take the matter in hand and to provide what should prove to be a really efficient technical school, working under conditions which should meet the requirements of the case. Premises in Bolt - court, Fleet - street, formerly used by the Stationers' Company of London for their day schools, were placed at the disposal of a joint committee composed of members of the Technical Education Board and of the National Society of Lithographic Artists. These were altered and adapted for the purposes intended and were fitted with a modern equipment of adequate capacity. Of necessity, the school was allied with art classes of the ordinary description. The class-teaching has been graduated so as to present a very comprehensive view of the subjects dealt with and is so arranged that the maximum number of students present does not exceed the number which can be properly dealt with at any one time. This limitation of number is always desirable; too little regard is paid to it generally in commercial or literary subjects, and in pure and applied science; but in technology its importance cannot be overrated for the constant contact between teacher and pupil is absolutely essential.

Besides the ordinary class-teaching, opportunity is afforded to facilitate as far as possible the progress of students by allowing those who have reached a certain standard to attend the school for independent practice.

Originally the classes were open only during the evening, but for the past eighteen months they have been also at the disposal of students during the day time; the fees are moderate, and are certainly within the means of any member of the trade desirous of joining the classes.

The complete course of instruction at present arranged deals with the production of negatives and positives for the various photographic processes, with the transfer of the image on such negatives so as to prepare printing surfaces; with the making of photo-litho transfers, and with the preparation of collotype films ready for printing. For the "relief" or letterpress process the work is continued through the various stages of etching and fine etching until the completed block is produced ready for the printer. At present the course stops short at this point, but it would be advantageous if room could be found for the necessary appliances to add to the equipment so as to secure a really sound training for those workmen in the trade who are engaged in the final operations of clearing up and mounting the blocks. This part of the business is at present somewhat neglected, and it might be arranged for as a special department of the work to be undertaken in connection with electrotyping. Although comparatively speaking a detail, it is yet a very important one, and in one's daily experience it not infrequently happens that blocks upon the preparation of which a great deal of care and attention has been expended are damaged, if not wholly destroyed, by careless mounting. Since the introduction of half tone work of finer grades than formerly prevailed, more delicate surfaces have to be handled, and the need of greater attention to this matter is imperative.

Notwithstanding the fact that the provision of adequate facilities must in this as in all other industries be a work of time, and that it takes a still longer time to impress upon the average English workman the benefit which he will derive in his ordinary daily occupation from attendance at a technical school, it is satisfactory to learn from the last report of the London County Council Technical Education Board that during the past year 97 students, of whom nearly two-thirds were actively and directly engaged in the process

trade, joined these classes. The remaining 37 students, consisting of artists, lithographers, and letterpress printers, were also intimately concerned with the subject. The teaching is above all things practical and the amateur, as such, is sternly repressed. In the various departments into which the work is divided there were altogether 164 entries. Looking to the results obtained the cost of equipment and maintenance is extremely moderate.

Although London is the principal centre of the industry the influence of the school is likely to be far reaching, inasmuch as several firms have now established studios and workshops in rural districts, while the larger provincial towns are being gradually rendered independent of the metropolis by the opening of independent works or by the erection of branch establishments by the London firms.

It is frequently a source of complaint that the Polytechnics and schools for technical instruction in this country are not altogether in touch with those for whom they are intended. So far as I have been able to gather this is not the case with the school whose work I am now referring to, but the reflection occurs that to secure the greatest efficiency and to gain the confidence of a wider circle of operatives there should be associated in the control and direction of this school a number of representative process-workers who would possess greater authority than the National Society of Litho Artists. There are now in London alone upwards of sixty firms and individuals engaged in the industry, and from among them it ought not to be difficult to make a satisfactory selection of governors.

In one direction there is need of and room for immediate extension. So far as the manipulation of the mechanical details of process-work for letterpress printing is concerned finality would appear to have been almost reached, but there is a tendency to try to produce more artistic results by combining with the operations of the process-worker the methods of the wood engraver, and already some very fine results have been obtained. There is some controversy as to how far this is permissible, and without very careful training of the engraver for this special class of work it may readily result in degeneration. Some provision then must be made for instructing for this purpose the large and increasing number of engravers who have been pushed out of their own vocation by the encroachment of process-work upon the field hitherto occupied by wood engraving.

Undoubtedly the most widely known and the most exclusively practised of all the processes, are those which are based upon photography, but there are besides a number of automatic processes which have either fallen into disuse, or are only employed to a very limited extent. As time goes on it will, no doubt be possible to include a practical instruction in some of these as part of a general systematic course of technical tuition in process work. Also it may be hoped that at no very distant date, as the result of the work of this school, we shall establish as regular industries in this country some of those extremely beautiful processes of chromo-collotype, which have been so successfully operated on the Continent, and by the Germans in particular.

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Mr. H. J. POWELL asked if they were to understand that the classes did not attract the right class of men to them.

Mr. W. BOUTALL said he did not intend to convey that idea, but rather that at existing agencies in connection with practical electrotyping—for instance, the Finsbury Technical College—too much attention was paid to this subject from the point of view of those engaged in general work in electro-deposition, and too little from the point of view of the printer. He considered that the making of electrotypes for printing purposes ought to be treated as a special subject.

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#### TECHNICAL EDUCATION IN CONNECTION WITH THE GOLD AND SILVER TRADES.

BY W. AUGUSTUS STEWARD.

(Chief Instructor at the Central School of Arts and Crafts).

During Her Majesty's long reign considerable changes have taken place in the Gold and Silver Industry and the allied trades. Changes in fashion have been responsible for the growth and decay of several branches of the decorator's art, but changes in the methods of production have worked greater revolutions. Machine processes have been introduced which have materially affected both the makers of gold and silverware and the decorators thereof. Stamping and spinning tend to transform the smiths into fitters, while the press has been largely responsible for the partial decay of the art of *repoussé* and ornamental engraving. As a consequence entirely new systems of organisa-

tion and manufacture have taken the place of those obtaining sixty years ago. No longer is every part of a brooch, chain, casket, cup or vase made and decorated by hand, or does the average gold- or silver-smith feel himself capable of designing and making any article of jewellery or silverware. The introduction of machinery has almost changed the hand-worker into a mechanic, and by the sub-division and specialisation of labour is gradually transforming him into a unit in a large sectionalised factory, while apprenticeship for this and other reasons is practically dead. Hence the necessity for technical education. But the provision of technical education for these trades has been so slow and small that it is difficult to speak of it other than from the elementary standpoint. The first attempt to provide artistic and technical education on a large scale for the various workers in precious metals was made at the Vittoria-street branch of the Birmingham Municipal School of Art in September, 1890, the art department being controlled entirely by the Museum and School of Art Committee of the Birmingham City Council, and the technical room by the Birmingham Jewellers' and Silversmiths' Association, who were responsible for the fitting up and equipment. In the metropolis the attempts have been both meagre and badly organised. At the Regent-street Polytechnic a class for silversmiths was started in 1884, but was discontinued a couple of years later owing to the falling off of students, and the teacher's inability to give the necessary time. At the same school a class for goldsmiths was established, the first year that the City and Guilds of London Institute made goldsmiths' work an item in their syllabus. This was in 1891, Mr. Harry Stapleton starting and conducting the class with marked success, while for several years previous to this classes in *repoussé* had been running at the same school, at Alic-street, and Essex-house. The only attempt to provide specially applied artistic training for those employed in the gold and silver industry was made by the Goldsmiths' Company at a little school in Charles-street, Goswell-road, conducted by a German master named Meyer; but this has been dead for some years. This sums up the definite attempts made to give assistance to the young workers in precious metals before the advent of the Central School of Arts and Crafts. So that with the revolution in the methods of production, and a lack of artistic and technical training, it is not surprising

that the crafts of the gold and silversmiths have not made the same progress as other artistic crafts, but now, through the establishment of the Central School of Arts and Crafts, at Morley-hall, Regent-street, by the Technical Education Board of the London County Council, and the Northampton Institute in Clerkenwell, the void is being filled, and opportunities offered the young workmen to improve themselves as craftsmen. Still it is essential to look back and find, if possible, why those engaged in the industries under consideration have not taken advantage of the small classes started for their benefit or of the ordinary art schools. This can be largely explained by the inherent dislike of technical education exhibited by the older workmen, whose influence, acting on the lads, restrained them from entering the classes, but the theoretical character of the teaching, the fear of examinations, and the want of practical teachers in touch with the trade had much to do with the paucity of attendance. These and other causes will also explain why art classes have not been patronised. The system in vogue under the South Kensington authorities induced the teachers to urge the lads to undergo examinations, which always led along a beaten track, in order that the teacher could obtain grants by the pupil's success, little or no account being taken of the fact that the student desired his education to be of such a character as would make him a better gold or silver worker. The ordinary art schools taught a lad how to use his pencil, but the feeling was always uppermost in the minds of those who were anxious to improve themselves, and continued their studies notwithstanding the drawbacks, that they should have such a training as would fit them for the special trade they were following. This fortunately is now the feeling of some educational experts, who viewing the question from the artistic and technical standpoints, believe that the best results will accrue by allowing students to study art and design in relation to their own particular craft. But it is still difficult to induce the young craftsmen to attend the drawing and design classes. The antagonism of the older workmen has been broken down by the perseverance of some of those in actual touch with the men and their unions, while the youths are now more willing to attend trade classes, but the methods of the modern workshop have driven all idea from the minds of the average youth of the utility of even free-hand drawing, their argument being that the

draughtsman makes all the necessary designs and working drawings, and the craftsman's business is to work to the drawings supplied him. They fail to realise that a training in freehand will give them a better idea of line, and so enable them the more readily to realise the contour of the article they are called upon to make.

How then shall we induce the younger workers to undergo an artistic training? The only means I am convinced (by a long workshop training, and by intercourse with members of the trade when a student and now as a master), whereby drawing even in its elementary stages can be made palatable and interesting to those whom we wish to teach, is by giving them studies to copy which at once appeal to them by the fact that they, the sketches and models, exhibit some connection with the particular handicraft the lad is following. For instance, simple vases, boxes and the like for the silversmith, animal and floral forms, natural and conventional for the goldsmith, chaser, engraver, or carver. Once having interested the lads it will not be so difficult to induce them to study in a wider field. But the main question and the more debateable one, is the giving of practical instruction in the crafts. Various views are held as to which lines the classes should be organised upon. The workpeople and employers hold the view that the classes should be strictly restricted to those actually engaged in the trades, while others seem to think that it is the proper thing to turn out jacks of all trades and masters of none, on the off chance of finding a Cellini, or that unattached art students should be allowed access to the classes, so that having served an apprenticeship to art, they might apply it by acquiring a knowledge of gold or silver working, but, so far as London is concerned, the regulation of the Technical Education Board, which governs not only its own schools but all institutions which it assists by grants of money, declares that such classes must be strictly confined to persons employed in the trades taught. This, I venture to say, is a carefully thought out regulation which will, if adhered to, ensure the right kind of pupils and give them a greater interest in the schools.

Classes should not be established to supersede the workshop, but to supplement the training received therein. Viewed from the commercial standpoint it is largely a waste of time to teach the smith or spoon-maker to chase or engrave, or the chaser or engraver to do smiths' work; constant employment only

can ensure such ability as will enable a workman to gain a livelihood, and it will rarely happen that an employer would, in these days of competition, employ men to move from one distinct division of a trade to another, and back again. From the artistic standpoint, or looked at as an acquirement of knowledge, it would not be labour in vain, but, as instruction calculated to enable a workman to gain a living by partly following a craft he can only learn by attending a school five or six hours a week, it would be misapplied. It will be argued that, given the opportunity, students will be found with such natural ability as would enable them to excel in several or all the branches of the gold or silversmiths' trade; this can readily be granted, but we must recognise the fact that there will always be a large number of persons engaged in the craft who will have to earn their living by working as units under the factory system, that is, if the mass of the people are to have jewellery and plate. It is forgotten that the art-craftsman can only appeal for his work and consequently his living to the select and monied classes, so that, while realising the possibility of raising some from the ordinary routine of the factory or workshop, we must not forget that the bulk of those attending our schools will have to continue under the factory system and turn out such work as will hold its own against all competitors. It is necessary, therefore, that the students should be enabled to make themselves more proficient in that section of the industry to which they are attached. From this it will be gathered that I am opposed, when viewing the question from the commercial standpoint, to the system prevailing at the Vittoria-street School in Birmingham, under which every effort appears to be made to induce the students to enter a branch totally different from that to which they are apprenticed or working at, instead of mainly encouraging them to improve their knowledge of the special branch in which they are hoping to gain a livelihood. For instance, a lad at Vittoria-street will be induced if he is a smith to learn chasing or engraving or *vice versa*. To those who understand how the trade is sectionalised this system is not a good one. The gold and silver trades are split up into various sections; roughly speaking the silversmiths are divided into seven sections—designers and modellers, large workers, small workers, spoon and fork makers, engravers, carvers, chasers and piercers, plate polishers and spoon and fork polishers; and

between each group there is a more or less rigid line of demarcation existing. On the surface, engraving seems a small item to be so distinctly marked off as one branch but this is gradually being split into sections, and so we find monogram and heraldic hands or those who engrave inscriptions and cyphers only, here therefore much can be done to improve the knowledge of students in all the kinds of work to be done in this branch.

It would be difficult to enumerate all the articles coming within the province of the small workers, but with the modern methods of workshop organisation learners have little chance of acquiring the practice which would enable them to take a position with the feeling that they could carry out any job brought to them. Cases have come under my notice in both the gold and silver trades where lads have been so kept to the working of one article only that they have been practically useless when put to another job of a somewhat different character in the same branch. Amongst goldsmiths there are designers and modellers, mounters, setters, chain-makers, locket makers, makers of bracelets, ring makers and carvers, polishers, &c. Engravers, general carvers, chasers and enamellers, and besides the foregoing, there is a body of men who though working in gold and silver are classed apart from both divisions as watch-case makers and polishers. However, from the foregoing classification it will be recognised that both the gold and silver trades fall naturally under four main groups; the designers and modellers; the makers or smiths, who make up in metal the prepared designs; the engravers, chasers, carvers, enamellers, &c., who apply to the articles ornamentation of various kinds, according to designs prepared either by themselves or the designers; and finally the finishers and polishers who finish the work. These divisions at once suggest what, in the main, should be the work of technical education in the trade. The first and most important thing is teaching drawing and design, but, as I have previously pointed out, considerable difficulty has been, and still is, experienced in getting students to recognise this prime essential in an artistic craft, but I think if my suggestions are carried out, the difficulty would be considerably minimised. All members of the gold and silver trade should have access to the drawing classes, and if they would reap the full benefit arising from the establishment of technical schools, should study freehand and geometry, special attention

being paid to plan and elevation, modelling, and subsequently design.

In the workshops students should be induced to make themselves thoroughly proficient craftsmen, and assisted to take up such work, in their own division, as they have few opportunities of practising in the workshop during the day. For instance, a gold- or silver-smith who has got into a shop where but a small selection of special articles is made would find it greatly to his advantage to study under a skilful teacher the methods employed in the production of other pieces. The engraver specialised as a "monogram" or "inscription" hand needs the opportunity to learn the other branches of the engravers' art, or that of enamelling, while the chaser, probably on "repair" work all day, would find it a considerable advantage to study chasing as an art, or to learn *repoussé*. There are a number of other ways in which help could be offered the craftsmen willing to improve their workmanship. The introduction of machinery, and the increasing uses to which stamping and spinning are applied, renders it essential that every effort should be made to ensure that the crafts shall not be depleted of those capable of actually "smithing" or hammering up a piece of work. To the smiths, therefore, and especially to apprentices and learners in this division, any opportunities to improve themselves in the art of getting out and producing their work by hand should find every favour.

I think it will be admitted that, with such a wide field in which to labour, the first aim of the technical schools should be to make a student thoroughly proficient in his own particular branch, and to use every endeavour to get him to understand the paramount importance of drawing and modelling, but this will not be found difficult if the right kind of men are selected as organisers and teachers, for the success of the classes will depend very largely on the teachers. These, in every case, should be practical men, with a thorough knowledge of their particular branch of the trade, and over these should be a master, with artistic and practical knowledge of the various branches of the industry. It is essential to the success of a school or class that the master and teachers should inspire the students with confidence and this I am convinced in technical schools can only be ensured by the appointment of the kind of teachers I have suggested.

I have endeavoured to place before you, as shortly as possible, what has been done and what I think is now required to ensure the

success of technical classes in the trades connected with the working of gold and silver, and to those interested in the improvement and uplifting of one of the most ancient of crafts. I offer these few suggestions in the hope that the craft in which I have spent the best part of my life, and in which I am keenly interested, may benefit by the practical discussion and suggestions which I trust will follow my paper.

## WATCH AND CLOCK MAKING.

BY T. D. WRIGHT.

Technical knowledge is, perhaps, more necessary to the watchmaker than to any other craftsman. The work is so minute that the uneducated eye does not see clearly enough, and, unless the workman engaged in one branch has some knowledge of the principles involved in the construction of the whole machine, and an intelligent appreciation of the duties of the parts made by others, he may waste days in the production of a beautiful specimen of manipulative skill which is wholly unfitted for the work it has to do.

In olden times, if a clever master had an intelligent, willing apprentice, the youth obtained a technical education of the best kind, and we are, no doubt, indebted to the apprenticeship system for most of the old masters whose productive skill obtained for us our reputation in horology.

The men, however, who, combined with practical skill, had the required scientific knowledge and the willingness to devote the necessary time to the instruction of their apprentices, were at all times few. Many young men finished their apprenticeship with but little more technical knowledge than they had when they commenced, and with practical skill in only the one narrow channel in which their employer had found their assistance the most profitable. The tendency was to train the apprentice in the way most likely to be directly remunerative to the employer, and, although this had the advantage of producing specialists who executed their own particular pieces of work admirably and quickly, and thus promoted an economical subdivision of labour which aided cheap production, it did not add to the ranks of the capable workmen who are always ready for unexpected emergencies, and who have the ability to adapt themselves to new designs and improved methods of construction. I think the failure of the apprenticeship system may be traced to the most flourishing days of the

industry, for it was then that subdivision was carried to its greatest excess. It was no uncommon thing to find young men who had been engaged for seven long years in a sub-branch which could have been efficiently taught in as many months. As these branches were easily, and the most frequently overstocked, the young man had to direct his energies into some other channel, and practically to learn his business after he was out of his time. If, in his training, he had been taught to file and turn properly, and had that lightness of touch which can only be acquired in youth, and which is so necessary to the watchmaker, he would, after a time as an improver, possibly become a good workman; but many of the subdivisions did not give him this opportunity, and we need not be surprised that when the man had sons of his own to send out he was unwilling to submit them to the same unsatisfactory experience.

Even in the branches which give greater opportunities of obtaining knowledge, parents are not inclined, in these days of free education, to pay a money premium for the instruction of their sons, and when the premium is paid in service, the master has to repay himself for the time spent in instruction and experimental work, by directing the training of his apprentice, during at least part of the time, into some channel that shall be profitable, consequently the system of manufacture tends to run in grooves and ruts which limit the opportunities of the young man to acquire knowledge, and confirm the older workman in a machine-like course which resists change of any kind.

Free education and the necessity of carrying on business profitably are facts which we must adapt ourselves to. If the old forms of apprenticeship are not suited to the times we must remodel them. In a business like watch-making some form of apprenticeship is absolutely necessary. The requisite skill and delicate manipulation can only be gained by practice and training. If we give up apprenticeship altogether we probably give up the trade. In some branches the term might with advantage be much less than seven years, and in all branches I am in favour of shorter terms, with an intermediate stage as an "improver," where the earnings of a young man will be proportioned to his skill and industry. If, during these probationary periods, he is able, after workshop hours, to improve himself in drawing, in mechanical knowledge, and in those branches of practical work which are directly associated with the one he is actually

engaged in, he will be qualifying himself to become a master of his art.

The promoters of modern technical education recognising the wants of many industries, and attributing the shortcomings, at least in part, to imperfections in the apprenticeship system, sought by creating and encouraging sources of instruction outside the workshop to remedy the evils we suffered under. By studying what other nations had done they obtained valuable suggestions, and much good has been done. Time and experience are teaching us where the course adopted should be continued, and where it should be modified to produce the most beneficial results. In horology, as I dare say would be the case in other mechanical trades, although there was no active resistance to the new ideas, there was a passive obstruction, or an apathetic neglect which impeded rapid progress. The general feeling was that the movement was a good one, but too many of the trade stopped at that point and gave no real aid. Some employers encouraged their workmen and their own sons to attend the classes, and as the advantages gained manifested themselves, their example was followed by others. A few—very few—practical men had no faith in technical education, except that gained at the bench, while others were at first inclined to attach a value to theoretical knowledge which it did not possess. For instance, an employer in want of a good workman, finds among the applicants a young man who brings evidence of an intelligent understanding of his business, who has, perhaps, distinguished himself in a theory examination, and scarcely questioning him as to his practical ability engages him to fill the vacant post. If he has been fortunate in his selection, and the man is as clever at the bench as he was at his studies, and happily that often is the case, all goes well; but if on the contrary he is unfortunate in his selection, and obtains an indifferent workman who can neither work as well or as quickly as the workman who never studied at all, he decides that technical education is a mistake, overlooking that it was he who made the mistake in assuming that one quality necessarily implied the possession of another. These were the errors of the early days, but time is removing misunderstandings, and we all know now that although theoretical knowledge cannot take the place of practical skill, an intelligent assistant who has it can make better and more profitable use of his intelligence than one who has not been trained.

The young watchmaker cannot too soon learn that his very first qualification is the ability to execute his work well. If he studies he soon finds out for himself how much his progress is helped by a knowledge of the whys and wherefores, how much clearer he sees the path to take when a difficulty arises, and how much more interesting his calling is than he thought it was. To me one of the most pleasing results of technical instruction has been to witness the interest of the student when he begins to understand the nature of his business, and the keen appreciation with which he realises, as he progresses in his studies, that his occupation is not a mere drudgery but really an intellectual pursuit. I do not think this feeling would ever be quite lost under the most adverse circumstances. It is not surprising that a clever lad should take pride in an occupation which has been so useful to navigation, and which requires for its proper understanding some knowledge of astronomy, of mechanics, of the effects of heat and electricity, and other natural phenomena. We frequently find that in addition to knowledge directly acquired, a desire is kindled for further study, leading sometimes to independent research and invention of importance, but always to an increased interest in the daily occupation. If the originators of technical education had done no more than to promote this affection for, and interest in, one's everyday work, we should have much to thank them for, but more material benefits have been gained. During the years that the classes have been conducted at the British Horological Institute, some hundreds of young men have attended, and I could point out many to-day who attribute their advancement in no small degree to the instruction they received there. In the other schools of horology conducted at the Polytechnic Institute, Coventry, Edinburgh, Aberdeen, and other places, I have no doubt similar experience could be shown. The consequence is that we have had, for some years past, a new generation growing around us. The relative values of the different branches of knowledge are better estimated because many of those interested in the matter have taken an active part in it. The good influence spreads beyond the pupils themselves, for it often happens that the son or apprentice may be able to make some suggestion, which proves to be an improvement, and which was prompted by his observation of what was being done outside his own workshop.



One important result of technical education I should like to mention, and that is the invention by Mr. Bonniksen of his rotary escapement, which has proved so successful at the recent Kew and Greenwich Observatory trials. Mr. Bonniksen was a student of the Horological Institute for some years, and during that time his natural ability and perseverance gained him considerable distinction; Breguet's tourbillon interested and attracted him, and in the course of his experience in timing and adjusting he saw how useful such a contrivance could be. But the cost and delicacy of Breguet's invention prohibited its general use, so Bonniksen set himself the task of inventing something on similar lines which should be strong enough to be carried in the pocket with no more risk of injury than an ordinary watch, and which should add little, if anything, to the cost. His "karrusel" watch is the successful result. About three years ago his perfected design was submitted to the trade, and many manufacturers consented to make up one or two as an experiment. If doubts of its success did possibly exist those doubts are rapidly disappearing. During the year 1894, a few were finished and sent to Kew for the usual trials. Seven obtained the "especially good" certificate. The Kew report for 1894 states: "The watches entered for the highest test, class A, have been decidedly above the average in quality, the number of these (46) obtaining the highest form of certificate (class A, especially good), being *considerably in excess of any previous year.*" In 1895, 27 out of 56 were "karrusels," and in the report for 1896 we find that 96 watches obtained "especially good" certificates, 60 of which were "karrusel" levers. In the recent deck watch trial at the Greenwich Observatory a "karrusel" lever heads the list, and a number of them, manufactured by various firms, obtained high positions. No horological invention in this country has had so rapid and pronounced a success.

I should not presume to claim this invention as a direct result of our efforts to promote technical education, if I had not received the inventor's own testimony. During its conception he assured me how much his technical training assisted him. His mechanical knowledge helped him in determining the proper proportion of the various parts, the relation between the motive power and the balance in the new conditions, and the possible effect of friction in the rather bold departure from conventional lines in the arrangement of his rotary carriage.

His ability in drawing enabled him to complete his design on paper, so that he had no blunders to correct when he started the manufacture of the rough movement for the general use of the trade.

We watchmakers had almost reconciled ourselves to the belief that our art had attained the perfection of mechanism, that there was nothing to improve. Bonniksen has taught us that improvement is possible, and so long as 100 marks at Kew, or an O trial number at Greenwich is not obtained—and probably they never can be reached—or so long as a watch does not wind itself up and show itself independent of the eccentricities of its wearer, there will be room for the clever man to invent improvements.

I cannot pretend that the system of producing watches in England by machinery is an outcome of the technical education scheme, because machine construction preceded it, but that the promoters and conductors of successful machine factories possessed technical knowledge in a high degree there is no gainsaying, and that their success has been helped by the growth of technical knowledge I am sure. I believe that the highest grades of watchwork will always be produced by skilled hand labour, assisted more or less by machinery as it always has been, partly because the hand system lends itself more readily to changes and improvements in design, and partly because the machine cannot detect faults in material and construction as the good workman can. But there is no doubt that the general watch of the future is a machine-made one. Successful factories are now established in London, Coventry, Birmingham, and Prescott, and I am proud of the certainty that some at least of their productions, modelled on the best types of English hand-made watches, are the very best machine-made watches in the world.

The success of the machine factories need not alarm the young watchmaker, or cause him to fear that his occupation is gone. In the most perfect machine system a considerable amount of skilled labour is required, and the increased output of home productions will probably absorb more skilled labour than was ever required in the whole trade under the old systems. In springing and adjusting watches there is a want in the machine factories of competent workmen, and young men will be wise to perfect themselves in this branch. I am hopeful that the new Northampton Institute in Clerkenwell will shortly be able to offer assistance to watchmakers who wish for oppor-

tunities of improving themselves in this direction.

Clockmaking as carried on in London has some advantages over watchmaking for the apprentice. In the first place it is not nearly so subdivided, and the youth has a much better opportunity of making the whole machine, although it is not usual to quite do that. Then the work is so much larger that he sees and understands much better, and I think it wise to let the lad who is to become a watchmaker spend his first year in the clock shop. The general principles are the same, the methods of working differ in some respects, but the differences are instructive and help the training. I am speaking now of the ordinary house clock. The manufacture of turret clocks is on altogether different lines and would probably not be a suitable training for either the watchmaker or the maker of small clocks. But the broad principles of design and construction are on the same lines, and one of the purposes of technical education is to help the members of these different branches of horology to get more in touch with one another, and by studying each other's methods, to possibly obtain useful hints.

The manufacture of house-clocks is capable of great development in this country. In the near future, electrical clock-work must play an important part. Both of these facts should receive due consideration from the trade, and from the technical institutions concerned, and some preparation should be made to supply the wants of our own country.

Technical education has of late years, and I think, rightly, tended more and more to include practical instruction in its syllabus. Technical councils, are, I think, fully alive to the fact that purely scientific education is likely to go over the heads of the majority of the workers, and fail in its usefulness. They welcome the assistance of the various trades concerned, in arranging their classes, so that they may be technical in the fullest and most perfect sense.

Mr. STEWARD asked if Mr. Wright did not think that the tendency of machinery as applied to watch-making was to stereotype the class of watches produced thereby, owing to the expense of altering or laying down new machinery. Mr. Bonniksen was deploring the fact that several of the large factories did not take up with his epoch-making inventions on that account.

Mr. D. BUCKNEY thought there was not much in the paper which anyone could take exception to. Mr.

Wright said there was no doubt that the general watch of the future would be a machine-made one. That implied that the hand-made watch must go to the wall altogether. He (the speaker) hoped that would never be the case, because the machine-made watch could not be looked upon as so scientific a time-keeper as a hand-made one. Mr. Wright had also referred to the apprenticeship system, but they might take it for granted that so far as watch and clock makers were concerned, apprenticeship was dead. It had never been satisfactory. One reason for the decline of the apprenticeship system was the fact that employers received a premium varying in amount, and as soon as they had received it the apprentices were turned over to the workmen, who received no consideration whatever for what they were teaching. Another reason was that the work that the apprentice turned out during the early years of his apprenticeship was practically useless to an employer. The theory work that was being taught now-a-days was of very little use unless it was followed up by practical instruction. It was sometimes found in examinations that the paper work was done like a book, but when they came to test a man's practical capabilities they were found to be not worth a rap—he would not be able to earn his salt. They had to look and see how the present state of things could be remedied. Shortly, practical classes would be started of an evening in the Northampton Institute. That was all very well, and would no doubt be productive of a great deal of good to workmen who wished to avail themselves of the opportunities offered there to improve themselves. But something was wanted beyond that. How were they going to provide the best workmen of the future? He did not think it could be done by evening work alone. He thought it would be necessary to establish a system of day work, which could be done by scholarships and paying students. At all events, lads ought to have an opportunity of working a certain number of hours during the day at the practical part of the work, and the theoretical work must go hand-in-hand with it. It might be taken alternately in the evening, as a sort of recreation, with drawing and the study of physics, metallurgy, and several other kindred branches of science which were likely to prove useful. By that means, he thought, they would provide the trade with a certain number of actual workers. Mr. Wright had also referred to what had been done in the classes of the British Horological Institute, and he (the speaker) joined with him in the feelings of pride with which he viewed the success of the many students who had been trained there. They unfortunately had one difficulty, and that was that they had not been able to reach the actual worker. They wanted to produce men who were prepared and intended to earn their living at the particular branch to which they had devoted their attention, and he should have liked to hear a little more from Mr. Wright of what he suggested in that direction. It was, of course, difficult to take

men trained under the old system and educate them to new ideas, and it was far easier and better to take the lad and work him up to do what was required of him.

Mr. WRIGHT, in answer to Mr. Steward, said machine systems did decidedly tend to do away with the artist; but the machine system was not one to be followed by what he called a workman. That Mr. Bonniksen's invention was not taken up by the big factories he did not think need frighten either Mr. Bonniksen or anyone else, and for this reason, that the great difficulties machine factories had to contend with would always leave some opening for the hand-worker. The factories could not easily adapt themselves to a change, whether that change was an improvement or not. It was so difficult and costly to alter the plant in order to introduce anything new and decidedly good that the hand-worker for the time being would have that good thing all to himself, and that should be looked upon rather as an advantage to the worker, while watch making by hand was really a trade. There was no doubt that inventions like Mr. Bonniksen's would from time to time crop up, and if they were as good as his so much the better for the hand-worker that it was a difficult matter for the factories to adopt it. Mr. Buckney seemed to think that he (the speaker) suggested that the hand-trade would go altogether. He did not intend to suggest that; but he thought that probably 99 watches out of every hundred that were used by the ordinary public would be made by machinery, and he did not see why 90 out of that 99 should not be made in this country instead of being imported from abroad. He was pleased to see the success of some of the English watch factories. Those who were not in the trade and had nothing to do with watches had no idea how good they were, although they were a long way short of the watch Mr. Buckney referred to. He did not agree with Mr. Buckney in thinking that the system of apprenticeship was dead. He (the speaker) thought apprenticeship in some shape or form was really necessary in a business like watch making. His own idea was that a lad who was going to be brought up to the trade should be put for a year in a clock shop to make the tools and the smaller parts, and at the end of the year the boy or his guardians ought to make up their minds whether he is suitable for watch making; or if he is too heavy-handed for watch work, whether he is to go to clock work. He should then be apprenticed for three years. At the end of that time he would not be a finished workman, but he would be competent to take a situation as an improver, where his earnings would depend upon his ability. During all this probationary period he should be encouraged to attend technical classes which give instruction in drawing and in the mechanical principles concerned in his trade. The Northampton Institute was new, and the evening classes had to be tried, they had to find out the wants of the district; but if it proved eminently successful,

there was no reason why it should not be turned into a day school, and become a school of horology, where young men could be taught in a proper manner the beginnings of their career, and encouraged to go on in the special lines which were best fitted for them.

Mr. PARKER RHODES said we were much too conservative in this country. Watches and clocks were most essential, and yet we were only using the timepieces and time indicators of former ages. There was absolutely no improvement: he admitted there was improvement in the mechanism, but there was no improvement in the construction of the dial of a watch or a clock. If they made the Government feel the necessity of giving support by small subsidies, there would be encouragement for those who were now exerting themselves almost fruitlessly over the tasks they had set themselves. Although so much had been done to improve the character of watch and clock making, there still remained a very large amount to be done to accomplish what we all desired, viz., a correct time indicator.

Mr. Alderman T. SNAPE (Liverpool) said the Technical Education Committee of Lancashire, at an early stage of their history as a committee, had sought to establish technical instruction with reference to an industry that at one time flourished in the county, but had since fallen into decay—the horological industry. A few years ago Prescott and Coventry were the two chief seats of the watch manufacture of this country, but at the time they came into possession of the funds the industry had fallen away, and they thought if by establishing a horological school they could revive that industry, and give back to Prescott the fame it once possessed of being the seat of the manufacture of the best watch movements in the world, they would be doing a good service to the county, as well as to that particular industry. The reason for the decay was owing to the fact that Americans had begun to manufacture watches by the aid of machinery, while the English continued to manufacture theirs by hand. In order to carry out the idea members of the committee visited the schools of horology in France, Switzerland, and Germany. They found a great difference between their system of technical instruction and our own. The system was a kind of school apprenticeship, and the scholars went from the elementary schools to these training schools. There they remained for four or five years, and were taught, practically and theoretically, everything connected with the manufacture of a watch, from the simplest process to the most difficult. In this way they succeeded in acquiring perfect skill in the construction of a watch, and before their four or five years term of tuition was over they were able to construct a watch from beginning to end. The result was that when they left their schools they were received as full journeymen into the employment of the various watchmakers in the country. One difficulty they experienced with their school at Lancashire was.

that they could not get their students to remain long enough, and another difficulty had been that after they had completed their training in the schools the trade would not allow them to become journey-men watchmakers without serving an apprenticeship. In the Black Forest they found that the schools had extended their tuition to other matters besides watch-making; they had begun to train their students in the manufacture of delicate electrical instruments. And in this country, if we were to keep ahead in the matter of electrical engineering, we should require very skilled handicraftsmen, who could construct the requisite delicate apparatus to develop the electrical discoveries that are being made. He had visited the Polytechnic School of Horology—the only one he could find in London—and he found it in a very feeble condition; he did not know whether it was still in existence. He believed there was also a class that was supported by the Watchmakers and Clockmakers' Association, but he had not come across it. In conclusion, he wished to point out that, if we were to prevent the loss that we were now sustaining through the decay of the watch-making trade which formerly flourished in our country, we must in some form or other endeavour to supply that technical instruction which these competing countries were giving to their students, and which was absolutely indispensable to enable us to regain the position we had lost. They had at Prescott a very large watch factory established on the American principle. That factory was growing and employing, he believed, as many as a thousand hands, and was very successful notwithstanding the competition from abroad. But how much better it would be if all the people employed in that factory had had the benefit of a thorough technical education.

Dr. WALMSLEY (principal, Northampton Institute) said that apprenticeship schools, as carried on on the Continent, were quite familiar to educationalists in London; but some of them considered that an apprenticeship school was not quite the solution of the difficulty, and that for many reasons. There were commercial reasons. Apprenticeship schools would turn out finished watches and so enter into competition with the trade, because a school which was endowed and equipped with skilled instructors, where waste of material was not of very great consequence, could produce watches under conditions which were not trade conditions. Though there is to be a Horological Department, it is not intended to set up an apprenticeship school in the new Northampton Institute for this particular industry, for they considered as a general rule that the manipulative skill in any industry could only be acquired by long practice in the factory, and the time that would be spent in acquiring that skill in a school could be far better spent in other ways—in teaching the art and principles of the craft rather than acquiring mere deftness of hand. He might add that the question of the connection of the electrical instrument making with watch-making had been perceived by them, and there

was on foot a scheme for combining the two. They were opening their first year classes in clock-making to electrical instrument makers, philosophical instrument makers, cycle gearing makers, and all trades in which small gearing played a part; and they hoped that they would thus meet a very definite want.

Dr. GARNETT said he should like to ask Mr. Snape whether the organisation of the great and successful industry in Prescott was of such a character as to give opportunity for technical schools to be useful in the training of the workmen there employed, or whether the work was so much subdivided that only the springers and timers required technical instruction in the laboratory or in the watch-makers' technical school. Those were questions which lay at the root of technical instruction for the watch-making trade. The governing bodies of Polytechnics and other technical schools wanted to know whether they could hope to benefit the watch-making trade as carried on in the factory, or whether they could only hope to benefit the man who made his watch from beginning to end with his own hands. There was a serious difficulty in this country in the way of the establishment of apprenticeship schools on account of the question of what to do with the output of those schools, for unfortunately a school which was organised in the fashion of a workshop could not be carried on without making up something, and the material in some trades became a very important item in the cost of running the institutions. When the plumbers' classes were started in the North of England, a meeting was held at which there were present representatives of the employers, of the foremen, and of the operative plumbers, and ways and means were part of the subject discussed at that meeting. It was arranged to open classes, and to establish a plumbers' workshop, and promises were made, chiefly by employers in the room, of the whole cost of the equipment of the workshop. When the question of the material came up, it was stated that there were present persons who would purchase for their ordinary trade the work done in the workshop, and that the work so purchased would cover the cost of the depreciation in the metal spoiled. That looked very pretty, and no complaint was made; but within a few days it was announced that no articles made in the shops would be allowed to be used in the trade at all, but that everything that was made was to be kept for museum purposes, or hammered up, on the ground that no wages were paid for the work. Such action was, perhaps, quite justifiable. In the matter of lead work, it involved a comparatively small cost, but in other trades, the cabinet making trade, for example, this question was one of much greater importance, and it was necessary now in London to face the question, whether in the cabinet making trade they should compel the students in the technical schools to make chairs and tables and wardrobes and bookcases of one-half or

one-third their usual size, and so make pretty models which were too big for dolls' houses, but too small for use, or whether, as he suggested, they should try some system of adopting a bonded store, as in the case of excisable articles, and undertake not to put to practical use the finished work until a sum had been paid upon it, equivalent to the ordinary wages as determined by a trade committee, and that sum so paid should be handed over to some friendly society in connection with the trade, in order that it might be used for the benefit of the trade which had produced the articles. It seemed to him that in dealing with the precious metals such difficulties, unless solved, would be fatal in the way of establishing apprenticeship schools in this country.

Mr. SNAPE said at Prescott the workers were kept to their own particular branch of the industry. The same thing applied in the cotton weaving, and cotton spinning classes in Lancashire. The factories kept one man at the mill, or they had another at the carding-machines, but that did not prevent them recognising the great importance of establishing cotton-weaving and cotton-spinning classes, and trying to get as highly trained a population to carry on this industry as possible. Those classes were found to be extremely useful. They could not expect that they would be attended by everybody employed in the industry, but the best part of the workmen attended the classes, and they were the part from which they got their foremen and managers.

Mr. STEWARD said that last week he had visited several large factories in Coventry, and there, side by side with workpeople making watches by machinery, he found men making the different parts by hand, and, in other cases, saw men making every possible piece of the watch by hand. The machine barely touched it.

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## TECHNICAL EDUCATION IN RELATION TO GLASS MANUFACTURE.

BY HARRY J. POWELL.

Glass manufacture comprises many distinct branches, differing in organisation as well as in technique. Some branches involve large establishments, minute subdivision of labour, and the employment of large numbers of workpeople, whilst others may be regarded almost as "home" industries.

In the manufacture of plate-glass, of sheet-glass, of bottles, and of "pressed" glass, the labour is to a great extent mechanical, and the necessary training can only be acquired in the works. The workman's efficiency will not be increased by a knowledge of the chemistry of glass making, and although manual dexterity

is essential there is no scope for artistic craftsmanship. The managers, however, should have been trained as chemists and engineers, and in works in which optical glass is made, they should also be physicists and mathematicians. The knowledge required by the manager of large glass works cannot be gained by attendance at courses of evening lectures. The most efficient aid technical education can render to manufactures dependent on applied science is to create a supply of competent managers by selecting capable lads from the secondary schools and maintaining them for three or four years at science colleges of university standing.

The manufacture of table and decorative blown-glass is generally carried on in comparatively small establishments. The smallness of the manufactories is advantageous from an artistic point of view, inasmuch as the wares produced possess a certain individuality, but disadvantageous from the fact that it is seldom considered economical to employ scientifically trained managers, and consequently the manufacture is carried on by the light of applied tradition rather than by the light of applied science. The smaller glass works, therefore, might benefit by the creation of a central institution, such as would be required for the training of managers for the larger works, to which the problems, which are constantly presenting themselves in all glass works, might be referred for solution.

The managers of works in which decorative ware is produced, are, or should be, master craftsmen. They require artistic training, but must be thoroughly conversant with the technique of glass making, and are able to learn more of glass design in the works than in a school.

The late William Morris, writing on the subject of technical education, said that to attempt to train a craftsman in a school is like trying to teach a boy to swim without water. Young glass blowers certainly cannot be trained in school, although schools might render them valuable assistance. The glass blower requires delicacy of touch, the power to appreciate form, and accuracy of eye. These qualities are helpful in all trades, and might well be inculcated in elementary schools. Boys, very properly, are forbidden by law to commence work in a glass factory till they are fourteen. If, when they are fourteen, their eyes and fingers, through want of proper training, are practically useless, they have little chance of becoming competent

workmen. Young glass blowers would derive benefit from attending drawing classes, but unless these classes are provided in the works there is very great difficulty in persuading them to attend. Glass blowing is carried on in six-hour shifts, day and night, from Monday morning till Thursday night or Friday morning, and lads are naturally unwilling to give up any part of their Fridays and Saturdays to classes.

The requisite training in the glass house is long, and the prospect of success is small, it is, therefore, not surprising that, whilst skilled glass blowers, in spite of high wages, are becoming scarce, it is more and more difficult to persuade capable boys to enter the trade.

Some adequate inducement is needed to persuade boys to undergo the necessary training, as well as to give up some part of their leisure time to drawing.

The subsidiary trades of glass cutting, glass engraving, and tube working, are carried on in the larger works, as well as, to a certain extent, as home industries. They require considerable manipulative skill and long practice. The necessary apparatus is not costly, and the principles of the trades might be taught in technical schools. The demand, however, for cut and engraved glass is very limited.

It occasionally happens that a glass blower, trained in a glass factory, having saved money, starts as a manufacturer on a small scale, with a miniature or "crib" furnace in his back yard. He buys broken glass, melts it in small crucibles, and with the help of members of his family, makes lamp chimneys, bird fountains, small bottles, and other inexpensive goods. If such men could be persuaded to seek instruction in the principles of glass making they would be able to produce goods of better quality and greater value.

The artist in stained glass and the mosaicist can doubtless derive substantial aid from the art school, as study from the life can be better carried on in the school than in the workshop, but both glass painters and mosaicists must learn the technique of their crafts in the workshop.

It must always be remembered that the demand, whether for scientific or artistic education in connection with glass manufacture, can never be large. A single section in a single institution could supply sufficient scientific managers for all the glass works in the British empire; and a single art class in each town or district in which glass painters or

mosaicists are employed would fully meet the demand.

An inquiry, as full as the time has allowed, leads to the conclusion that, whatever may be the case with other British industries, the aid derivable by glass manufacture from technical education must be very limited in extent.

NOTE.—The following are extracts from letters received relating to the value of Technical Education to the glass industry.

"We have not received any aid in the shape of Technical Education for our section of the glass trade from any source.

"BAGLEY & Co., Yorkshire."

"In this country Government grants are limited to the artisan class, whereas in Germany the Technical Schools are chiefly used by a higher class with the result of turning out a supply of trained managers, for whom a thorough knowledge of chemistry, physics, drawing, and, indirectly, engineering, is of course of the highest value. We have no evidence that a glass maker (*i.e.*, worker) is improved by Technical Education, and a revival of the old system of apprenticeship would be of far greater value and importance. The difficulty now is to get lads to thoroughly master their trade, which can only be learnt in the workshop."

"CHANCE BROTHERS & Co.,  
"Birmingham."

"There has, quite recently, been an attempt to form a class from youths employed in glass-houses to study form, &c., at the School of Art, but I very much question whether any practical good is likely to result to the trade. My experience is that it should rest with the employer to supply designs, and be prepared to go into the glass-house and actually explain to the makers how his ideas are to be carried out, but then the difficulty comes in as to how far the society will allow its members to be free agents in the hands of the employers.

"L. J. MURRAY,  
"Hon. Secretary of Midland Association  
"of Flint-Glass Manufacturers."

"We have had no experience of technical education, but I may say that some of our best workmen have been instructed in drawing, and there is no doubt that a technical training would raise the standard of workmanship, and elevate the moral and social character of our members.

"J. J. RUDGE,  
"Central Secretary of the National Flint Glass  
"Makers' Society."

"So far as our own business is concerned, there can be no better school for those who desire to enter the glass trade than the glass-house, cutting, engraving, and etching shops, and the various other departments in the manufactory itself.

"THOMAS WEBB & SONS, Stourbridge."

Mr. BOUTALL said he should like to add to what Mr. Powell had said with regard to the danger of indiscriminate art teaching. There were a number of people who had had a certain preliminary training as draughtsmen, and were imbued with the notion that they were artists. For every genuine specimen of artist who had been produced by that kind of training, there had been at least 99 who were rank failures. There was this further danger, that while these persons were devoting their attention to a general art training they were probably neglecting some important application which would be useful to them in the work of everyday life. The study of the theoretical principles which underlie any industry should go on side by side with the practical training. Technical education should not supplant but should supplement the workshop training. With regard to the failure of the apprenticeship system, it seemed to him that probably the wisest course to pursue in regard to a general system of technical education would be to endeavour to resuscitate apprenticeship in some shape or form, and to combine the work of the technical school with it.

Mr. POWELL said one great difficulty with regard to trades which required manual skill was that of attracting boys into them. They had great difficulty in learning the trades, and both the boys and their parents feared they would never be successful, the boys, therefore, became errand-boys and clerks, instead of entering a factory where, if they took pains, they could earn high wages and become useful members of society. What he suggested was that Technical Education Boards should found scholarships for boys which should be dependent partly on regular work in factories, and partly on attendance in classes, so that theoretical and artistic work should run hand in hand with work in the factory. If some such plan could be devised, it would encourage young lads to take up skilled trades, and at the same time it would encourage them to be regular and attentive in their work. The London Technical Education Board had made some steps in this direction, but their scholarships were entirely dependent on attendance at classes; something more was wanted—something that would encourage these lads to attend regularly, and give the whole of their faculties and interest to work in the workshop as well as to work in the classes. Some such plan would be exceedingly beneficial in all trades where manual dexterity was absolutely essential.

## TECHNICAL EDUCATION IN ARCHITECTURE AND THE BUILDING TRADES.

BY W. R. LETHABY.

### DEFINITION OF ARCHITECTURE.

In giving this title to the short paper which follows, I do so to explain its scope in current

phrase. For myself, however, I must explain that I acknowledge no distinction between architecture and building. Architecture is the resultant of the association of the several building trades—it is the centre of gravity, as it were, of the crafts in combination.

While it is generally admitted that there is now no common speech and tradition in building matters, no current style of architecture, there has been much attempt to extol this architecture as something quite superior to mere common building. Fergusson, for instance, in trying to make out such a distinction says, in effect, that building is mere heaping of material together, while architecture is building done with thought and arrangement. He thus gives the title of building to a wholly supposititious product which has never had any concrete existence, so that he may give the title of architecture to building as we know it historically.

It suffices to say that the building product of antiquity is never so treated; the history of the architecture of Greece is what we know of the buildings of Greece—religious, military, domestic; the architecture of the middle ages is the masonry and carpentry, the smithing, plumbing, and so on, brought together in the wonderful works of that age. It follows, therefore, that the endeavour of the historians of art is to get at the typical and spontaneous in the art of the past so to re-construct the ages by all the monuments they have left behind. Modern English architecture is truly the whole product of the current customs of building in England. The architecture of London is the mass of building from Bow to Putney and from Hoxton to New Cross; and it is in the multitude of ordinary and characteristic buildings rather than in the few and exceptional ones that what is typical of this architecture will be found. The question of education in architecture is therefore not a question of nice scholarship which might affect the more costly buildings, half-a-dozen restaurants, clubs and insurance offices; it is the question of influencing the building of mean streets and the ordinary dwellings and meeting places of men. It is not merely an academical question but one of enormous practical importance to humanity and civilisation.

### THE MEANING OF STYLE.

An explanation of the more apparent causes which led to the admitted break-down of tradition in architecture—that is building—in these modern days is part of a long story. Before

glancing at it, it will be well to gain a clear idea of what this thing "style" has been in the past when art was, as we say, living. At such periods, architecture, as we can now see, was a natural development, the outcome of the experimental building carried forward by masons and carpenters. We see the needs and aspirations of society, the materials used by the builders, and all the other conditions of climate, circumstance, and thought so directly influencing their manner of building that it became a common and organic growth. This organic principle of building, the *style*, was a remarkable essence, a principle of growth born of the contact of mind, senses, and emotions with outer conditions; this style was not an accident, not a thing to be willed or altered, it was in the nature of things spontaneous, communal, national, racial. A building was a natural product another kind of tree, as it were, growing on the earth's surface, answering to every condition of soil and climate, and responding to every breeze of thought.

Literature is but the written word, architecture is the builded word; the writer and the builder are alike nothing except so far as they crystallise some of the thought stuff behind phenomena—the ideas waiting to be born. And, further, a true style can only answer to one moment in the world's history; we may speak of Hellenic, or Byzantine, and of the 13th and 14th century styles, but really style changed from day-to-day. Any mere invention, if it were possible, of new shapes, any intentional originality, would be as trivial as our copying of the styles of the past. Of course, I must be understood to speak of expressional forms, not of useful inventions.

Our modern relation to facts on the side of architectural thought is, of course, exactly represented by our current building speech. We are revealed to ourselves in the corrugated iron shed, the mean meeting-house, the restored cathedral, the sham Gothic church, the sham Renaissance town-hall, the dull workhouse, silly villa, and the general vulgarity of the streets.

All this is ourselves built large, and yet I hope that we are not so bad as we look, for we are the victims of our historic position, and if we find ourselves in a *cul-de-sac* we didn't put ourselves there. Still it is a melancholy reflection that all this time there would have been a true style of building proper to this moment alone in the world's history, if we could only have been in connection with the great governing principles of practical building, a vital

stream, instead of being choked by the scum of an outspent eddy of scholasticism.

I am going to become more practical instantly, but what becomes of the architecture never built—the architecture of 1897?

#### OUR HISTORIC POSITION.

At the beginning of the sixteenth century a vast revolution occurred all over Western Europe. The Church broke in two, traditional customs were largely replaced by statutes imitated from Roman law, the free towns were overawed, and the national folk architecture withered up before a fashion for imitating Roman building seized on with avidity by all the Courts in Europe. Reformation, Revolution, Renaissance, were but complementary phases in the fields of religion, politics and art of one great movement, by which the guilds were dissolved, the ideal of the towns uprooted, and the craftsmen who governed them taught their place. The guilds of the workmen had been inextricably bound up with religious brotherhoods and with the corporations of the towns (the municipalities or communes were, indeed, based on the guilds) so all were struck at together.

The revival of learning, as it is called, worked in perfectly with the great wave of reaction and absolutism. Roman law was ransacked for pretexts, and a scholarship of Roman art became a lever to thrust out of the way the customs of the crafts as held by the guilds. At this time a set of drawing-master designers, commercial travellers in art, came from Italy, and hung about the Courts of France, Germany, and England, and displaced the old master masons and carpenters who held the living traditions of building art. These Italian designers were for the most part painters rather than masons, and from this time the architect became a painter or drawing-master of buildings rather than a graduate of the shops.

As the old architecture of the people was to be broken down, arguments were easy to find. One of the most potent and convincing of these arguments is that which is set out by one of the earliest and ablest of the drawing-master designers of France, Philibert de l'Orme, thus:—Roman architecture was antique; Solomon's temple was built in antiquity, therefore Solomon's temple was built according to Roman architecture; but the plans for Solomon's temple were drawn in heaven, therefore Roman architecture was divine and revealed, and the ways of building followed by the mediæval



masons were of the nature of heresy. It was necessary, according to De l'Orme, to return to the "vray" architecture in its purity.

Building from this time ceased to be experimental workmanship, tradition behind and reason in front; it became an essay in "vray" architecture; and scholars in classical antiquities passed themselves off as "architects," which they could the more easily do as the old experts in building were employed to do the work while the scholars provided the pretty patterns, not according to the customs of the craft any longer, but such as might tickle the fancies of Italianised employers.

But it is easy to see that this theory could not last. Scholarship feeding on a limited field soon exhausted itself. Nothing remained to the scholarship theory of architecture when this exhaustion had become apparent, but flatly to reverse the argument, and this Pugin did. Pugin arose with beautiful enthusiasm to prophesy that the old despised way of building practised in the middle ages which had come to be called "Gothic" or barbarous was the true Christian style after all. Then the scholarship engine was set going once more full speed astern.

This cry, in turn, exhausted itself in some sixty or seventy years; we can see, indeed, that this was in the nature of necessity. This second school of copyists were not nearly so unanimous as the former, nor were the students so self-convinced, yet it is to be noticed that both these revivals (so-called!) were entered on with a certain belief and fervour—the revival of antique, true, or revealed architecture, and the revival of true, Christian, or pointed architecture. The first entirely succeeded in suppressing "Gothic" architecture; the second only half succeeded in establishing sham Gothic architecture.

So much for the immediate past; what of to-day? These two enthusiasms having been worked through, scholarship is not equal to another act of faith and has fallen into architectural scepticism. We don't believe in any architecture being "vray" now. So far as scholarship of design goes there is now no attempt to work in concert except by the professors of church restoration, who follow Essex and Wyatt in rebuilding the cathedrals to taste and with dispatch. This tail of the Gothic revival, cannot however last for more than a few years. When all the real Gothic has been altered into sham Gothic, that enthusiasm also will have evaporated.

All theories of what has been called

"architectural design" have entirely broken down under examination, and it has become apparent that the truer the style is, the closer is its relation to its time and environment. It has become apparent that there is no absolute architecture, but that true style and rational building can only be the outcome of the conditions of the moment in the wise satisfaction of true needs, and by the interaction of handiwork and the materials with which it deals.

While we have been finding out this, it has become as clearly evident that any lingering remnants of the old system of workmanship preserved traditionally by the workmen are disappearing. Just as we have realised that the very basis and main substance of architecture are beautifully built walls of carefully selected materials, timber framed in a workmanlike way, deftly laid plaster, columns proportioned to material, windows and doors shaped for service, and so on, and not certain patterns arbitrarily selected by a professor of design, it has become evident to us that the body of workers' skill which the earlier masters of "design" like Wren had to deal with has been continuously decaying and disappearing since the destruction of the guilds. For be it remembered that some of the methods of the guilds survived for long their official destruction. At the beginning of this century the theory of the crafts being based on due apprenticeship was still maintained. And in country towns some who called themselves masons *and* architects were still to be found.

We designers on the one side have lost faith in scholarship in design; on the other hand the workers are untaught and therefore unintelligent and uninitiated.

#### THE GUILDS.

To look back again to the middle ages. The masons and carpenters' guilds were faculties or colleges of education in those arts, and every town was, so to say, a craft university. The folk of the middle ages were not so ignorant as to look on dead languages, history, and statistics as the only forms of learning. Masonry, carpentry, smithing, plumbing, were media for the exercise of intelligence and aspiration. It has been well pointed out by a recent historian of the Universities, that they are but surviving examples of the associations of the middle ages—Scholars' guilds.

Corporations of masons, carpenters, and the like, were established in the towns for the ruling of production and the teaching of the craft. Each craft aspired to have a college

hall; and a city like London was full, first of the buildings of the religious brotherhoods—the churches; then of the halls of corporations or lay brotherhoods. Guildhall was, as it were, the secular cathedral on which the smaller company halls depended, like parish churches, of trade and craft. We are usually told that “feudalism” was the social principle of the middle ages, as if there had been a “social contract.” The truth is, society in the middle ages formed itself into groups, mainly in accordance with the callings of its members. The association or group, not the individual, was really the unit of society and basis of competition.

The guild, which regulated all the customs of the trade, guaranteed the relations of the apprentice and the master craftsman with whom he was placed—master, be it noticed, not in the sense of employer, but in the sense of graduate of his craft college and wearing its robes. The boy was really apprenticed to the craft as a whole and ultimately to the city, whose freedom he engaged to take up. The boy apprenticed to a mason mixed mortar, tidied the shop, and generally learnt his craft by assisting an expert during a seven years’ course. Each master might only take one or two apprentices at a time, for they learnt by working with him. At a certain stage the apprentice became a companion or bachelor of his art, and later by producing a master-work, the thesis of his craft, he was admitted a master—one of the governing body of his college; and only thus was he permitted to become an employer of labour. Then as a citizen the dignities of the city were open to him and the great things of his art. He might become the master in building some abbey or cathedral, or as king’s mason, one of the royal household, and the acknowledged great artist of his time in what was then called Mason-craft. The buildings of the middle ages are indeed wonderful, but is it so wonderful after all that they were produced when the building trades were so organised? Our ideals and system are as perfectly reflected in our modern architecture of London where a vast mass of common building, which I will not attempt to describe, is diversified here and there by a careful design done out of an architect’s head after study of the real mason’s art of the past, and built by farming out to a financial agent called a contractor, by gangs of men who have no say in the matter, and who for the most part have “picked up” their trade.

Some argument has been spent on the

question as to whether the modern trade unions represent the ancient guilds. The question in one respect is as nice a one as that of apostolic succession in the English church. In a broad sense, however, there is not the least doubt that guilds and unions are alike forms of those associations of the workers which are known to have existed far back in Greece, were highly systematised through the Roman and Byzantine eras, won their highest positions with the assumption of the government of the free towns by the merchants and craftsmen in the middle ages; and crushed and disinherited in England under Henry VIII. reappeared in the various forms of benefit clubs, wages unions, and the trivialities of freemasonry. What we call by the meaningless term Gothic architecture was the ordinary current work sanctioned by the guild. From such considerations I have reached the conclusion, that the building system of any time and country has always represented the state and activities of the guilds or unions. Now, as the organisation of scholarship is the affair of scholars, and medicine the business of doctors, only masons and carpenters can organise and develop the arts of masonry and carpentry. If ever a living style of architecture can again be made economically possible it is by the unions of the several crafts assuming guild functions, seeing to the education of its learners, setting a standard of quality in production—in a word, assuming the entire responsibility for the whole conduct of their crafts—and nothing effectual can be done without them. If the unions, stirring themselves in this way, can vitalise the building crafts, we shall get a building art once more, otherwise we shan’t. The real question before the unions is not one of a halfpenny an hour more or less in wages, but the architecture of their country. They are far from realising this responsibility—we are far from having a reasonable and living style of building.

#### OF SCHOOLS.

The members of unions or guilds must themselves consider the matter of education. This work done for them from without would be of comparatively little good. The education itself would be of less value than the interest and goodwill which would vitalise any craft which took up its own education. Moreover, there is likely to be large waste in any system of specialised craft education organised from without. Such a system often eats up the substance, by an artificial preoccupation with the fringes of a subject; and in too carefully

considering all the avenues of approach the thing itself at the centre may never be reached. Professional education generally is prone to run to grammar as in the English system of teaching languages. Literary organisers of education have a great dislike to empirical methods, but art itself is empirical, and our literary friends must not deceive themselves by their own phrases. If, as we are told, we are to be governed by experts, the things of art and craft must be organised by expert artists and craftsmen. Indeed, the modern literary view of education—that the chief end of man is to count statistics and read newspapers—must be broken with in approaching this question of craft education, for I believe we shall not get very far till we recognise that a literary education is only one of a dozen avenues leading to true but dissimilar culture. Craft excellence must once more be made an object of ambition, through which the craftsman as such may reach to some of the world's rewards, such as they are. The only reward obtainable in a craft must not be the getting out of it.

It should be a warning to craftsmen that the downfall of the crafts, brought about by the conspiracy of the Renaissance, has been confirmed in the name of science by the gentlemen who undertaking research into the laws of production and distribution, considered only quantity and never once thought about the quality of products. May I say here, in brackets, that the position the State, the public, democracy, or whatever we like to call it, occupies as employer of labour is a very important question indeed. At present public works tend to a base mechanism varnished over with what is thought to be ornamentation. What is the good of endeavouring to teach art if we would have none of it if it were produced?

But to return. School learning, however practical, can only form a small portion of the true education of the true craftsman. The organised crafts must further find a way by which the essentials of apprenticeship shall still be obtainable in the shops and on the works. The essential of apprenticeship is the association of a learner and craftmaster in real production, under the sanction of the guild; this also must ultimately be the affair of the unions. If we are to make architecture an experimental art once more the foundation of the whole structure will have to be a number of schools in the several building crafts. In a school of masonry for instance there would be a museum of stones and a collection of tools.

Strains and crushing weights would be investigated experimentally, and the equilibrium of arches and vaults studied. Problems of setting-out and practice in actual cutting should go hand in hand. Methods now gone out of use such as axing would be tried over again. Such a school in the hands of expert masons willing to consider methods new and old on their merits, would, I think, soon alter our current procedure. In a few years I should expect to see the present method of rasping the external face of masonry all over with a drag and leaving it to the weather with the pores well laid open, given up in favour of the traditional plan of finishing the face with a sharp cutting axe and coating it at once with whitewash, which in old times was used as a thin preservative coat of plaster. I should expect the trade taking cognisance of these tests of material and research as to methods to make known the results, so that a body of sound rules in masonry might be made available. At present masons whisper that certain large London works specified to be built of Portland stone are really often executed in Ancaster, or even Bath stone. The old guilds appointed "viewers," "searchers," or "wardens" to keep their eyes on this sort of thing, which they would not allow for the honour and true welfare of masonry. All this is the affair of the craft, and we must charge on the union the responsibility of seeing to it.

I suppose similar schools to exist for carpentry, plastering, plumbing, all of them nearly lost arts in any high sense; design in every case being approached as an outcome of positive conditions, not as an arbitrary pattern devised by hashing up the forms truly evolved in the past by experimental workers.

Architecture, as I have said, the combination of these crafts to special ends. The architect of the past (best represented by the building foreman of the present) was a mason or carpenter, and I am convinced that ultimately the great crafts should largely reabsorb the architect. In the mean time, however, although the path must be opened out by which the able practical mason and carpenter may become directors of building, it is necessary to educate a class who are specially brought up to direct crafts they do not practise, so that they may direct them as little capriciously as may be. The youth intended for an architect should in every case pass through the elementary stages of the masonry and carpentry schools along with the masons and carpenters, and he should have the run of all the other craft schools under certain

conditions. He should moreover in a special school of Building consider the crafts in combination and the conditions and traditions of the several types of arrangement suitable for different classes of buildings. As a return of courtesy and service this school of architecture should be open to the craftsmen who wished to know something of building as a whole. The architect's special work is to be an expert in arranging and combining. The quality and details of the masonry are necessarily mason's matters; the curls and twists of the ironwork are the blacksmith's business; plumbing, sanitary and ornamental, is plumber's work; it is a ruinous policy, which instead of throwing on the workers the responsibility in their several trades, stirs up their instinct to get the better of clerks of works and architects. The architect's essential function is not to guarantee the quality of materials and workmanship he does not fully understand; it is not to design ornament out of his head so that materials which he has never wrought with his hands may be tortured into a semblance of his intention by mechanical workmen; his true function is to arrange and contrive highly specialised buildings, to act as an intelligence

department for the several crafts, and as one having a knowledge of building as a whole to advise his employers.

At the present time building should be plain, straightforward, sound, and, as far as may be, reasonable; mere plainness and even baldness do not insult us like heartless bedizenment, or the assumption of the trappings of antiquity.

Mr. POWELL said the writer suggested that the unions were to take up the work of teaching building and architecture, he should like to know how he proposed to vitalise the unions, and get them to take up this work. So far as he knew, they were not eager to move in that direction at the present time.

Mr. LETHABY, in reply, said that was a large question, and approached the subject from above; his paper might be taken as intended to stir up the unions from beneath. It was not for him to show how everything would work. He thought the unions should get hold of funds and help wherever they could, but the types of craft education would have to be settled by the several crafts themselves.

The CHAIRMAN said it seemed to him that architecture was an art, and although you could train a man to a mechanical business, you could not make a man an artist by any amount of instruction.

THURSDAY MORNING, JUNE 17, 1897.—SECTION A.

WILLIAM BOUSFIELD, M.A., in the chair.

The CHAIRMAN, in opening the proceedings, said that he believed Mr. Mundella, in his speech yesterday, impressed upon the Conference the desirability of dealing as far as possible with the higher side of technical education. Of course, polytechnics dealt with rather a wider sphere, and embraced both the higher and lower sides of education; they were especially a London and an English product. He presumed the present discussion would more especially interest English people, inasmuch as our technical education was in the progress of growth, and that growth had proceeded in a peculiarly English manner. The polytechnics in London had to a large extent taken their lines from the work of Mr. Quintin Hogg, in his formation and development of the Regent-street Polytechnic. He did not think that in any discussion in which polytechnics were mentioned they could omit to mention the very great debt of gratitude that was owed to him for the self-denying energy that he had thrown into the organisation of this polytechnic. As everyone knew he had been prodigal, not only of his time and energy, but also of his money in the good cause, and he could look back upon this fact, that in taking this trouble and spending this money he had succeeded in setting an example which had been very largely followed in other polytechnics. The London polytechnics would have been impossible if it had not been for the use of the endowed funds coming from the City parochial charities, the direction of which had been shadowed out in the report of the Charity Commissioners, under Mr. Anstie. No doubt, a very large number of experiments had been made in the polytechnics throughout London; some of them had had permanent results, some had not. He did not think they ought to consider any of those experiments had been wasted. Even where the experiments had not led the way to a permanent line of teaching, they had always shown the difficulties which had to be met and the way in which other branches of teaching could be best developed. The other funds from which the London polytechnics had largely derived their resources came through an accident—the accident of the money coming from the wine and spirit duties being suddenly given to the various County and Municipal Councils. That he must characterise as one of the most happy accidents that he had ever witnessed in Parliamentary proceedings. Local bodies throughout England had been able to aid technical education in a way which would have been quite impossible if they had not had these funds to dispose of.

## POLYTECHNICS.

BY QUINTIN HOGG.

In dealing with the Polytechnic movement in London I must first of all ask my hearers to disabuse their minds entirely of the meaning which the word "Polytechnic" bears on the Continent. There it is applied to the highest grade school, whereas, with us it is intended for the rank and file rather than for the *élite* of the scholars, and there are other radical and essential differences which will be dealt with as I proceed with this paper. The very term "Polytechnic," though singularly applicable, arose more from the accident of the old Royal Polytechnic coming into the market at the time when the writer needed larger premises than from any deliberate choice of the name itself.

It has been suggested to me that it would be a fitting commencement to this paper, were I to trace briefly the growth of the Institute which created this generic name of "Polytechnic," and the history of which is more or less the history of a development on the lines of the least resistance, as suggested by practical experience.

The seedling first saw the light just after Christmas, 1863, when the writer took two crossing-sweepers into the Adelphi arches, which were then open to the river, and with a beer-bottle and a tallow candle for the entire lighting apparatus, a couple of Bibles wherewith to teach the letters of the alphabet as the entire school furniture, the two crossing-sweepers as the total of the scholars, and himself as the teaching staff, commenced a very elementary ragged school. This grew until it needed a home of its own, which was secured in "Of-alley," off the Strand, a court forming part of the estate of the great Duke of Buckingham, and marking the site of his river house, the streets George-court, Villiers-street, Duke-street, Of-alley, and Buckingham-street, giving the name of the nobleman in question.

A day school for small boys under a female teacher, a City Missionary working the district in the immediate neighbourhood, an evening school for elder boys with its comcomitants of

penny bank, lending library, shoe-black brigade, &c., were the agencies carried on in this small room with a rental of £12 a year. Soon another room was added, then the adjoining house was taken at a rental of £26 a year, wherein those boys who had no homes, or worse than none, could sleep for 2d. per night. But the success of a ragged school rings the knell of the ragged character, and for a school to keep entirely ragged in the full sense of the word, should probably be started afresh every two or three years. At the school in question, the boys gradually passed into the Shoeblack Society, and obtaining sufficient money to buy decent clothes, soon began to raise the standard of the school. Instead of ragged and almost naked boys (five of them used to come with nothing on but their mother's shawl pinned round them) cleaner and better class lads began to attend. The boys who did well in the Shoeblack Society were apprenticed, and brought their companions, young mechanics from small workshops, to the school, and after six years a move was decided upon to the neighbourhood of Drury-lane. Here the same influences were at work, and in 1871 a small Institute was formed, the members of which conducted the Ragged School, and had set apart for themselves a small house adjoining. Here, for the first time, science and art classes were commenced. The numbers grew until a boy had to wait over a year in order to get into the Institute, which was, to a large extent, self-governed, and in 1876, a fresh move became necessary, this time into Long-acre.

The Ragged School and Boys' Home were left behind in their old premises, and the entire space at Long-acre was devoted to the Institute. The limit of 500 members was soon reached, and once more a difficulty arose from the numbers' desiring to join and the very few desiring to leave.

It was in Long-acre that the present director of education, Mr. Robert Mitchell, who had previously been elected by his fellow members to fill the post of honorary secretary, took up the post of secretary to the Institute, and became the important factor he still remains in the development and conduct of all the variations of our polytechnic life.

By this time certain salient facts stood out clearly in the minds of those who had been working with the boys. The first was that, given a suitable place and suitable management, there was no difficulty at all in attracting London boys to an educational and social Institute; the second, that so far as the

writer could see, no existing institute had recognised the fact that God had given a young man more than one side to his character. There were educational academies, of which the Birkbeck was, perhaps, the most notable, which were educational and nothing more; there were religious institutions, such as the Y.M.C.A.; there were athletic clubs and working-men's institutes, but each and all were either solely educational, solely religious, solely athletic, or solely social, and what appeared requisite to those who guided the fortunes of the Polytechnic was a place where a young man could develop any one of these "sides," and would find a reasonable outlet for any healthy desire, physical, spiritual, social, or intellectual, which he possessed.

Another plain fact stood out also as the result of their experience, namely, that if you want a place for young men, you must more or less limit it to them, and that on the one hand very young boys or children skylarking about the place and turning it into a romping ground, or on the other hand middle-aged and elderly men who would scowl at any hearty laugh or youthful amusement, would alike keep away young men.

From the first, therefore, a limit had been imposed requiring candidates for membership to be between the ages of 16 and 27, though when once admitted they might remain as long as they chose.

In order the more fully to carry out his ideas, the writer determined to build an Institute which should afford scope for a many-sided work, and, as he hoped and believed, would serve as a model for other institutes in London. A large plot of freehold land lying between Holborn and Drury-lane had already been purchased when the old Polytechnic came into the market. The site was one that would be sure to challenge attention, more so than one hidden away to the east of Drury-lane, and after consultation with his colleagues, it was purchased and fitted out for the accommodation of an assumed membership of 2,000. During the nine months required for alterations and partial rebuilding, the numbers at Long-acre were allowed to go up to 1,000, and with that membership the great hall was opened on Sunday, September 25th, 1882, being crowded with 1,500 young men who met to celebrate the opening of the Polytechnic and to ask God's blessing upon it.

Up to that time it had been the writer's custom to see every boy individually as he joined, and in pursuance of this custom he

started interviewing new members at five o'clock on Monday, the 26th September. The numbers entering were prodigious. He was unable to leave his desk, even to get a cup of tea, until a quarter to one the following morning, and by that time a thousand new members had joined the institute.

In the meantime Mr. Mitchell had got out a very extensive class list, embodying, so far as could be, the experience of those who had gone before us. Trade classes, workshops, and technical classes of all kinds had been added to those which had been carried on at Long-acre, with the result that during our first session no less than 6,000 individual members and students made use of the Institute, and if, in dealing with the question of numbers, I may anticipate a little what should, perhaps, more properly belong to a later part of the paper, I may say that each succeeding year has shown a progressive increase, until at the present time no less than 16,000 members and students make use of the Institute each year. Nearly 5,000 use the Institute every day, of whom about twelve to fifteen hundred are day students, and the remainder evening students or members.

There are at the Polytechnic during the winter over a hundred classes every evening, and by attending to the reasonable wishes of the Trades Unions, we have not only not met with any opposition on their part, but in nearly every case with their assistance and advice, the rule having been strictly adhered to that only young fellows engaged in the trade taught may attend the trade classes.

The motto of the Polytechnic has been to endeavour to provide some training for the head, the hand, and the heart, and certainly no Polytechnic adheres to the original idea which misses out any one of these from its program.

The key to the whole position is the social life. Young fellows attend the Polytechnic from all parts of London and suburbs, coming in some cases from such places as Eton and Oxford to attend either the day or the evening classes. At any moment it is easy to tell how the Institute is progressing by going into the social-room, and noticing if the members are in brotherly touch with each other or the reverse. If the former is the case you may assume at once that the educational, physical, and spiritual sides are alike progressing favourably, and it seems to the writer that it is largely on the social side that the new Polytechnics incur the greatest danger of shipwreck. Again and again the writer has

been told that the social side will look after itself. So far from such being the case this same social side involves more trouble and personal labour than all the other portions of the Polytechnic work put together. Yet without this social side the Institute sinks into a mere academy, and ceases to be a Polytechnic altogether.

In dealing with large numbers such as congregate at the Polytechnic, it is almost necessary to deal with them by sections, and here the athletic and social clubs give powerful assistance. For the use of the larger sections special club-rooms are set apart permanently. Thus there is a club room for the Polytechnic Athletic Club, which includes cricket, swimming, Rugby and Association football, lawn tennis, and rowing. There is another room for the cyclists, who number from two to three hundred, and who constitute the best racing club in England. Another is set apart for the harriers, who, like the cyclists, number men holding amateur world's records amongst their members. Another room is set apart for the old day-school boys, who are encouraged to join the institute.

There are in addition almost innumerable societies, to wit, the largest local parliament in England, ramblers' society, several minor cycling clubs, boxing clubs, gymnastic societies, mutual improvement societies, reading circles, temperance societies, and others.

The athletic club have a boat-house at Chiswick, and perhaps the finest cricket ground in England at Wimbledon, while a large swimming bath serves its original purpose during the summer, and acts as a most efficient reading-room in the winter.

Amongst other attractions, and I use the word advisedly, is a very definite amount of distinct religious work. This is wholly unsectarian in the fullest possible sense of the word, and I think those who fear any hostile feeling to this side of the work would only have to mix with our members to assure themselves of its absence. On the other hand, it is difficult to over-estimate the value to any institute of the influence of those parents who care most for the well-being of their sons and daughters, and who throw the immense influence of a Christian home on the side of an institute where the spiritual side of a boy's nature is not ignored.

No rule exists for compulsory attendance at classes, but out of 16,000 attending the Polytechnic, no less than six-sevenths attend some form of educational work of their own accord.

Many a young fellow has told the writer that he joined the Institute solely to use it as a club, but was so struck with the atmosphere of work about the place that he almost involuntarily became affected by it himself.

Another very valuable form of social-educational work lies in the combination of certain classes. Thus the students in the engineering classes form themselves into an engineering society, as do those attending the French, shorthand, German, building, architectural and other classes. These educational societies, if I may so call them, involve no expense to their members, save that which is necessary for stationery and postage, but meet once or twice a week for the purpose of assisting each other in the prosecution of their common aims.

In 1887 a boys' day school was started, largely with the view of having a technical side, and it has long since reached its maximum of between five and six hundred students. Since then a girls' school of a little over 200, and an advanced engineering school of between 50 and 60 students, have been added.

Another very important class is the photographic, under an especially able master, who was the first to introduce into England the teaching of various processes which had hitherto been practised only on the Continent. Tailors' cutting, carriage building, and other classes of the kind are also held.

I have endeavoured in the above to give some slight sketch of the pioneer Polytechnic. It now remains for me to indicate how financial support has been provided for it, and for the others which have sprung up during the last few years.

Just about the time that the Institute was moving into the Polytechnic, the Royal Commission on Technical Education made its first report. Later on some of the members of this Commission visited the Polytechnic incognito, and were so struck by what they saw there, that they reported in the most favourable terms to Her Majesty's Government.

The London Trades' Council, on April 10th, 1883, passed the following resolution:—"That the system of trade teaching adopted at the Polytechnic Institute be recommended to the London trades." Three months later the same Council resolved that "In the opinion of this delegate meeting of trades, any system of technical, scientific, or theoretic instruction for our industrial population should be accompanied by practical teaching by competent trade teachers, based upon workshop practice,

in harmony with the requirements of ordinary business pursuits, similar to the trade instruction given at the Polytechnic Institute." More recently Mr. Woodall, M.P., a member of the Royal Commission on Technical Education, said that "he had, in connection with the Royal Commission, visited nearly all the technical training schools on the Continent, and he could safely say that he had not seen one in which such a thoroughly practical system was followed as in the Polytechnic Institute."

In the meantime another Royal Commission appointed to deal with the charities of the London City parishes, had resulted in the temporary addition to the Charity Commission of a new department, for the purpose of dealing with certain sums which had been left by benefactors, long deceased, for purposes which, from one cause or another, had really ceased to exist. An interesting paper might be written of itself on this subject. Lands, which at the death of the testator had brought in an income of £15 per annum, had in the intervening centuries, been built upon, and their income increased a thousand fold. Whole parishes had been absorbed by warehouses and banks, and the poor population had been replaced by a fairly well-to-do class of caretakers. Altogether the charities which had been scheduled by the Charity Commissions, possessed, in 1887, an income of £104,904 13s. 4d., of which £17,718 9s. 4d. had already been administered under the schemes of the High Court or the Charity Commissions, while schemes had been submitted, but not yet approved, for the administration of a further sum of £6,171 5s. 9d. This left £81,014 18s. 3d. to be dealt with, but the above did not include certain funds administered by the parochial authorities, but claimed by them to be the absolute property of the parish, and not the subjects of charitable trusts.

The Charity Commissioners found themselves saddled with the cleansing of an Augean stable. Some of the charities had no banking account, others had put down considerable sums under the somewhat comical title of "visiting the tombs," which upon examination was found to mean eating dinners at the expense of the charity. The entire parish of St. Christopher-le-Stock had been absorbed by the Bank of England, and another, St. Anne and St. Agnes, by the General Post Office, while St. Bartholomew-the-Less possessed one house only in addition to St. Bartholomew's Hospital. In many of the parishes all the parochial machinery was kept up. In others it was



found that there were no poor, though the Parish of St. Vedast claimed to have one poor person. Some of the title deeds and declarations of trust had been lost in the fire of London, and with them the history of the original objects of the trust of the testator. Much of the money was used for paying the poor rates of the parish, and thus relieving freeholders and tenants from their legitimate burdens.

It so happened, therefore, that a sum of money which may be capitalised at over three millions, became available for public purposes about the time that the need for improved methods of popular technical education made itself felt in England, and that general attention had been attracted to the Polytechnic through the report of the Royal Commission above mentioned.

The temporary Commissioners upon whom devolved the duty of preparing fresh schemes for the administration and use of this money were Mr. (now Lord) Sandford, and Mr. James Anstie, Q.C., with two Assistant Commissioners, Mr. E. Bond (now M.P.), and Mr. Henry Cunynghame. Lord Sandford did not actually enter upon the work of a Special Commissioner, and it consequently fell to the lot of Mr. James Anstie, Q.C., with the Chief Commissioner, now Sir Henry Longley, K.C.B., to undertake the responsibility of drawing up the new schemes.

To the wise and sympathetic action of these gentlemen the educational and social centres which have recently grown up in various parts of London are largely due. Sir Henry Longley still continues to discharge the duties of Chief Commissioner, and his name is constantly before the governing bodies of the various Polytechnics and others interested in their welfare as that of a wise and experienced adviser, with the rare gift of combining strict official supervision with that of understanding the value of individual idiosyncrasies.

It was on Mr. Anstie, however, that the great labour and responsibility of the work chiefly fell, and it was with regret that his friends saw him, when he had given to London its great scheme of secondary technical education for the poorer classes, retire like *Cincinnatus* into private life, anxious, apparently, that the 50,000 students who are now availing themselves of the advantages brought within their reach should never know the name of one of their chief benefactors.

The work of the Commissioners consisted in obtaining full particulars of the several

charities dealt with by the City Parochial Charities' Act, and in preparing schemes for the future administration of these funds. The principal scheme established the Central Governing Body of the City Parochial Foundation, to which was committed the administration of the funds, subject to the Commissioners' schemes, from the date of the cessation of the temporary powers of the Special Commissioners.

Into the schemes themselves we need not go too closely in this paper. They would require a pamphlet to themselves. Suffice it to say that London was to a great extent mapped out, and Polytechnics suggested for various parts, certain funds being offered conditionally upon local aid being found, and most of these bold dreams have become solid and beneficent facts. There now exist, in addition to the original Polytechnic in Regent-street, the following Institutes, most of them bearing the Polytechnic name, but all of them more or less running on the lines laid down by the Charity Commissioners as the result of their inspection of the Institute in Regent-street:—

The People's Palace (opened in 1887) endowed by the Charity Commissioners, but mainly supported by the Worshipful Company of Drapers.

The Goldsmiths' Institute at New Cross, opened in 1891, without funds of any kind save those supplied by the Worshipful Company of Goldsmiths.

The Woolwich Polytechnic, opened in 1890.

The South-West London (Chelsea) Polytechnic, opened September, 1894.

The Battersea Polytechnic, opened January, 1894.

The Northern Polytechnic, opened October, 1896.

The City Polytechnic, with which is incorporated the Northampton Institute (opened July, 1896), the City of London College (opened 1847) and the Birkbeck Institution.

The Borough Polytechnic (opened September, 1892) including branches at Norwood and Bermondsey.

Some of the above Institutes have been the subjects of munificent individual gifts. The Northampton Institute stands on ground given by the Marquis of Northampton and Earl Compton of the value of £30,000, while the South-West London Polytechnic stands on ground given by Lord Cadogan, of the estimated value of £10,000.

In the meantime a most valuable additional source of supervision and endowment had opened up from another quarter. In 1889 the Technical Instruction Act was passed, which empowered local authorities to levy a rate of one penny in the pound for the purposes of technical and manual instruction. At first little advantage was taken of the powers conferred by this Act but in the year 1890, the then Chancellor of the Exchequer, the Rt. Hon. George J. Goschen, passed through Parliament a resolution making available for the purposes of the Technical Instruction Act, certain moneys specially raised from beer and spirits, which had been originally ear-marked for the purpose of compensating individual publicans who might lose their licenses in connection with a scheme for regulating the liquor traffic. The compensation scheme failed, and the money raised for carrying it into effect was at the disposal of the Government. This money was placed at the disposal of the various County Councils, with authority to use it for technical education, a hint being given by the Government that if so used the grant would be made permanent. In the year 1893 the writer moved a resolution, which was seconded by Mr. Sidney Webb, who has ever since so ably presided over the Technical Education Board of the London County Council, setting aside a portion of London's share of this money for technical education. The first act of the Technical Education Board, which was created by the London County Council for the purpose of administering the grant, was to get a report by Mr. Llewellyn Smith, who had had much experience in educational matters in the East-end and elsewhere as secretary of the National Association for the Promotion of Technical and Secondary Education, on the condition of technical education in London. The report was presented, and various recommendations made, which have been carried out. The key-note has rightly been co-ordination. To borrow an illustration made use of by Mr. Sidney Webb when seconding, with admirable success, the resolution of the Board, who have been especially fortunate in their chairman, and also in obtaining the services of Dr. Garnett which was passed by the County Council in 1893, there were numerous pipes, all of them good and serviceable, but belonging to no one combined system, and Mr. Webb laid down a line of action which he has consistently carried out ever since, of endeavouring to combine whatever good work was going on in London into one efficient whole.

It would be difficult to speak too highly of the manner in which all those who have had charge of this great work of technical education in London, whether belonging to the Charity Commissioners, the Central Governing Body of the City Parochial Charities which was formed by them, or the Technical Education Board, for the manner in which they have consistently nurtured and strengthened existing institutions, instead of killing them out by starting rival centres of education of their own. Everywhere this beneficent system has been adopted, with the result that London has made extraordinary progress during the past decade, a progress which the writer believes is merely a promise of still better things to come. The proper status of the Polytechnic in the great scheme of technical education is gradually taking shape. It is not, and should not aim, at being a place for the talented few. These can be best dealt with by special schools, such as that at South Kensington, and possibly one or two carried on by the Technical Education Board on a scale, and with an amount of personal attention, which could not be achieved, and should not be attempted in a Polytechnic. The Polytechnic should deal with the rank and file of our artisan classes. It should endeavour, if possible, to specialise certain classes useful to trades especially strong in the districts where they may be located; it should act as a centre for the Board Schools and smaller evening schools in its own districts, and it should aim at having such other reasonable attractions, social, athletic, literary, and the like, as will draw the better class of young men and young women to its doors.

In the days which we all hope to see in the near future, when on well-marked rungs of the educational ladder, the Board School child shall be able to work his way from the free Elementary School through the Board Continuation Schools and the Polytechnic to the University, whether in London or elsewhere, the Polytechnic may well be a home, a smaller university and public school, to help our poorer fellow citizens to privileges which they have not had in the past.

Finally, let me indicate what I think likely to be the main danger of the Polytechnics in the near future. In the first place they should on no account lose their catholicity. If a certain number of students want any particular class (in the Polytechnic at Regent-street the number is 13) they should be allowed to have what they desire if it can possibly be managed. The Polytechnic should aim at attracting all

students by affording classes which would give some kind of encouragement to the natural bent of each. It should aim at encouraging the athlete, the cyclist, the cricketer, the literary boy, to join its ranks, so that while practising his favourite sport he may see before him, and utilise, educational advantages which he otherwise would not have thought of.

And if the writer may revert last of all to what he has insisted on in more than one place in this paper, the Polytechnic should be a home from home. It should be as sociable as possible, and as far removed from an academy as it can be made. Those few who guide it should be in touch with as many hundreds or thousands of the members and students as time and capacity will allow.

After all it is the personal influence that goes furthest, and speaking from an experience of nearly 34 years, the writer looks back on the influence arising from personal touch and individual intercourse as being the most potent of the forces which have made the original Polytechnic what it is.

At Regent-street, Mr. J. E. K. Studd has given some 13 years of his life, being present nearly every morning and every evening. Mr. R. Mitchell, the director of education, is as ready to consider and talk over any point involving sociability or recreation as sympathetically as one referring exclusively to

education. There is much more that the Polytechnic may do in this line which has not yet been touched on at Regent-street, or anywhere else. The writer would like to see an arrangement whereby one or two trained nurses would be able to assist and care for country boys lying ill in London lodgings. He would like to see a scheme on a self-supporting basis for lodging young men, somewhat on the lines, *mutatis mutandis*, so successfully carried out by Lord Rowton for a very different class. He feels sure that the more the Polytechnic can do to sweeten and brighten the lives of the young men and the young women of London, the more the educational classes, whether technical or otherwise, will prosper, and the greater will be the hold which these institutes will have on the well-being of the young men and the young women of our great city.

The following Table gives the number of students in the departments of Art, Science, Technology, Domestic Economy, Commerce, and Literature, in the Polytechnics named for the term October-December, 1896. It will be noticed that the figures are not given for the Northampton Institute and the Northern Polytechnic, which were not fairly at work last winter, and no figures have been received from the People's Palace. For the figures contained in the Table, the writer is indebted to the principals of the several Polytechnics:—

Institution.	Art.	Science.	Technology.	Domestic Economy.	Commercial Subjects.	Literary Subjects.	Total.
Regent-st. Polytechnic..	697	2,684	1,902	601	1,602	590	8,976*
Goldsmiths' Institute....	508†	885†	957†	1,112†	2,512†	176†	6,150†
City Polytechnics:							
Birkbeck Institution..	220	1,598	69	67	1,549	581	4,084
City of London College	155	796	81	—	1,155	324	2,511
Battersea.....	250	2,087	560	198	453	137	3,685
Borough (including Herold's Institute)....	82	282	975	256	401	162	2,158
South-West London....	200	603	1,231	111	253	87	2,485
Woolwich.....	158	960	38	45	206	34	1,441
Total.....	2,270	9,895	5,813	2,390	8,131	2,091	30,590

\* As many of these students attended more than one class, the actual number of class entries at Regent-street Polytechnic was 13,300.

† These figures refer to the whole of the previous session.

The figures given in the above Table do not include music and recreative subjects, and refer to only eight out of eleven poly-

technic institutions; except in one case, they represent the entries for one term only, and not for the whole year.

## THE WORK OF THE POLYTECHNICS.

BY PROFESSOR WILLIAM GARNETT.

Secretary and Educational Adviser of the Technical Education Board of the London County Council.

In the paper which he has just read, Mr. Quintin Hogg, the founder of Polytechnics, has given an account of the early history of the Regent-street Polytechnic and of the establishment of the Polytechnic movement in London. He has also set forth very clearly the conception of a Polytechnic and the leading principles which have guided the development of the great institution in Regent-street; but he has overlooked one fundamental point, and in this respect he has followed the example of those who looked upon the Regent-street Polytechnic as the type of the institutions to be erected out of the City Parochial Charities—he has failed to notice that the personal service and life-long devotion of Mr. Quintin Hogg and Mr. J. E. K. Studd, given gratuitously and ungrudgingly, to the Polytechnic may be obtained once in a generation, but are not to be secured by advertisement or purchased by public money. An organisation, such as that which obtains in Regent-street, cannot be created by Act of Parliament, or by schemes of the Charity Commissioners, or by the contributions of County Councils. It is the child of the spirit which initiated it, and has attained its maturity only under the fostering care of its parent. Other Polytechnics adopting similar lines of work and exerting similar influences on their members may be carried on when a similar personality can be secured to guide their fortunes, but any attempt to establish such an institution by the machinery of the State would lead to no greater success than that promised to all the king's horses and all the king's men in another connection. The most that can be done by public control is to see that the constitution of a Polytechnic Institute is sufficiently flexible to allow free scope to a Mr. Hogg or a Mr. Studd if such can be found. The Charity Commissioners' scheme for an industrial institute, which now serves as the common basis for the schemes of all the Polytechnics, has secured this freedom, and the Central Governing Body of the City Parochial Foundation and the Technical Education Board of the London County Council, the two bodies entrusted with the administration of the greater part of the funds available for the maintenance of the Polytechnics, have taken care to do nothing calculated to interfere with the freedom thus given.

Every Polytechnic, the buildings of which are

approximately complete, possesses its social and recreative departments, and its hall for public entertainments. These departments generally include reading rooms, refreshment rooms, social rooms for men and women, games, rooms, gymnasia, and sometimes separate rooms for the meetings of clubs. All these facilities are open to members of the institute, who, in most cases, are admitted to the educational classes as well as the public entertainments at reduced fees, but in some cases membership of the institute is confined to students of the classes, thus giving to these Polytechnics a distinctly educational, rather than social, basis. The Birkbeck Institution and the City of London College, situate within the precincts of the City, possess sites so limited that it has not been found possible to provide upon them all the social and recreative facilities desirable, or indeed the workshop accommodation required by distinctly trade classes, and on this account the Charity Commissioners have federated these two institutions with the new Northampton Institute in Clerkenwell to form the City Polytechnic, and have provided by scheme that the members of the Birkbeck Institution and the City of London College shall be members of the City Polytechnic, and as such shall enjoy the almost unparalleled recreative facilities of the Northampton Institute with its magnificent swimming bath, gymnasium, and great assembly hall.

The funds administered by the Central Governing Body of the City Parochial Foundation and the contributions of City Companies are available equally for educational and for social and recreative purposes, but the funds contributed by the Department of Science and Art and the Technical Education Board of the London County Council can be used only for educational work. The use made of the social and educational facilities of the Polytechnics must depend almost entirely on the voluntary efforts of the members, and these derive their life from the inspiration of a very few guiding spirits among the responsible officers of the institution, but the educational work is more amenable to external organisation and control, and where provision is made which meets the requirements of local trades, successful classes may in nearly all cases be secured.

In order to enable Polytechnics to meet the educational requirements of industrial students, it was necessary not only to provide workshops and class-rooms with adequate equipment but to furnish maintenance grants sufficient to enable the classes to be carried on independ-

this end to restrict the attendance at workshop classes to those who are actually engaged in the trades concerned, and have thus opportunities of acquiring the necessary manual dexterity in the performance of their daily duties.

8. To furnish an adequate fixed stipend for all teachers in place of a contingent interest in fees and grants.

9. To encourage private subscriptions and donations.

10. To establish an efficient system of inspection.

11. To facilitate the advertisement of Polytechnic classes, and especially to invite the co-operation of trade societies in supporting their respective classes.

12. To encourage the higher development of some special branch of study in each Polytechnic.

13. To utilise the Polytechnic buildings as far as possible in the day time by the establishment of technical day schools or otherwise.

14. To secure uniformity in the keeping of accounts.

In furtherance of these objects the Technical Education Board has offered to each Polytechnic:—

- (a). Such equipment grants as may from time to time be made by the Board for specific purposes on the application of the governing body,
- (b). A fixed contribution of £1,000 a year,
- (c). Three-fourths (not exceeding £500 a year) of the stipend of the educational principal,
- (d). Ten per cent. on the fixed salaries of the teachers,
- (e). One penny for each hour's attendance of each student, and
- (f). Fifteen per cent. on all voluntary subscriptions and donations from private sources,

Provided that the total payment to any Polytechnic in any one year under (b), (c), (d), and (e), does not exceed £3,000, and under (f), does not exceed £2,000.

The Board also makes special grants not exceeding £500 a year towards the cost of providing teaching of an advanced type in some special subjects, such as tanning and leather dyeing, at the Herold's Institute, Bermondsey, a branch of the Borough Polytechnic, and mechanical and electrical engineering at the South-West London Polytechnic. The Battersea Polytechnic is contemplating the establishment of a special

ently of grants earned on the results of the examination of individual students, many of whom meet with extreme difficulty in attempting to answer questions on paper; while any examination syllabus, however skilfully drawn up, fetters to some extent the freedom of the teacher when attempting to adapt his teaching to the special needs of a particular class of students. The effect of the well-equipped laboratories and workshops of the Polytechnics has been to attract within their walls nearly all the distinctly technical teaching in London, with the exception of that carried on by the City and Guilds of London Institute, and, independently, by a few of the City Companies.

The objects which the Technical Education Board has had in view in its dealings with the Polytechnics have been—

1. To allow to the several governing bodies the greatest possible freedom in the conduct of social, recreative, and even religious work within the provisions of the schemes of the Charity Commissioners.

2. To secure to each Polytechnic the services of an educational principal, who should be responsible to his governing body for the organisation and conduct of the whole of the work of the institution.

3. To provide in each Polytechnic a permanent staff of teachers, who should be heads of their respective departments and give their whole time to the work of the institution, and thus to establish a corporate or collegiate life in the Polytechnic, which would afford an element of stability, notwithstanding the fact that many of the teachers of special subjects are necessarily engaged only for the conduct of particular classes and cannot be expected to feel that their interests are permanently bound up with those of the Polytechnic.

4. To ensure that all branches of experimental science are taught experimentally, and that the students have the opportunity of carrying out practical laboratory work, at an inclusive fee not exceeding ten shillings for any one subject.

5. To provide efficient workshop instruction in all practical trade subjects.

6. To secure that the number of students under the charge of any one teacher in laboratory or workshop classes, or in other classes in which personal supervision is of paramount importance, shall not exceed a stated limit (fifteen in the workshop or twenty in the laboratory).

7. To exclude from classes students who, for want of preliminary training, are incapable of profiting by the instruction provided, and to

department in the chemistry of coal-gas and of oils and fats and some other branches of organic chemistry, and it is possible that electro-chemistry may find a home in the Northampton Institute in Clerkenwell, where steam power to the extent of about 400 horsepower is available.

For the further utilisation of the Polytechnic buildings and equipment during the day time the Board defrays nearly the whole cost of conducting day schools in domestic economy, where girls who have left the public elementary schools obtain half a year's instruction in cookery, laundry, dress-making, and housewifery free of expense, and in addition receive two free meals a day and materials for dress-making classes.

At the Battersea Polytechnic there is also established at the expense of the Board a domestic economy training school for teachers, where free training is given for two years in the teaching of all branches of domestic economy to the nominees of the Board.

The establishment of technical day continuation schools for boys and girls who have passed the sixth standard is rapidly becoming general in the Polytechnics. The Regent-street Polytechnic and the People's Palace have long been provided with day schools, that at Regent-street differing very little in its commercial and science sides from the modern sides of ordinary second grade endowed secondary schools. Battersea Polytechnic and the South West London Polytechnic established mixed schools for boys and girls at the time of their opening, and the Borough Polytechnic and Woolwich Polytechnic are making arrangements to open similar schools next September. The leading idea of these schools is the provision of two or three years training in science, art, and the use of tools, without neglecting the cultivation of literary subjects, for boys and girls who have left the public elementary schools and intend to enter industrial life. The work of the schools is so arranged as to avoid any breach of continuity when a pupil passes from a public elementary school into the Polytechnic day school. The teaching of elementary experimental science forms an important feature in the curriculum of these schools, and at Battersea the boys who have passed through the first year's course are divided into three sections, according as they intend to enter the building trade, the engineering trade, or the chemical trade, and their drawing office, laboratory, and workshop instruction is modified accordingly.

Indirectly, the Polytechnics are aided by the scholarships and exhibitions offered annually by the Board. Apart from the domestic economy schools, which are mainly supported by the Board's scholars, a large number of the Board's scholars and exhibitors attend the Polytechnic classes; in fact, nearly all the winners of evening exhibitions in science and technology (86 out of 101 recently elected), and a very large proportion of the art scholars and exhibitors come from the Polytechnics. Last year there were 141 of the Board's scholars and exhibitors in one Polytechnic.

Another indirect advantage to the Polytechnics is provided by the systematic inspection of classes carried out by the Inspectors of the Board, who include among their number specialists in art and artistic crafts, in science, and in general education.

The system described above has led to a general raising of the level of the education provided by the Polytechnics without sacrificing the interests of the artisan or apprentice, who is encouraged to attend not only the workshop classes but the drawing-office, the laboratory, and the lecture-room, where special classes in such fundamental subjects as workshop geometry, workshop arithmetic, and experimental mechanics are arranged for him. The teaching staffs of the Polytechnics now number many men who have taken high degrees at the universities, including several doctors of science, and the work carried out in the Polytechnic laboratories is not altogether innocent of research. Unfortunately, it is always necessary to face the fact that the middle classes are far more ready to seize upon educational advantages than the industrial classes, and this is a source of danger to the Polytechnics, which calls for perpetual watchfulness.

From what has been said it will be seen that the Polytechnics go very far to fill for the industrial student the gap which exists between the standards of the public elementary school and the university college, or the technical college of the City and Guilds Institute. The technical day schools link the Polytechnic directly to the public elementary school; the evening classes in science, art, and technology, follow on from the Polytechnic day school, the higher grade school, or the evening continuation school of the School Board; and these with the special advanced day classes lead up to the university college or the technical college, while in some of their more advanced classes the Polytechnics already deal with work of university standard, and among their

students are to be counted not only those who will proceed to technical colleges of university rank, but many who are preparing for the degree examinations of the University of London.

The weakest point in the educational organisation of the Polytechnics lies in the provision made for literary instruction. The study of "pure literature" cannot be aided under the Technical Instruction Acts and the Science and Art Department has no funds available for its encouragement. As a result of having no funds specially devoted to their support the literary departments of the Polytechnics have not made the same progress as the other departments. An attempt is now being made to remedy this. The Technical Education Board is not only considering the best methods of aiding the study of economics and other branches of commercial science, but is using its moral influence to encourage literary studies, while the Central Governing Body of the City Parochial Foundation, acting on the suggestion of the London Polytechnic Council, has increased its contribution to the London Society for the Extension of University Teaching in order to enable that society to provide courses of lectures and classes in literary subjects at the Polytechnics.

The total capital outlay represented by the sites, buildings, and equipment of the London Polytechnics exceeds £500,000. The annual cost of maintenance is a little over £120,000, of which about one quarter is provided by the fees of students and members, one quarter by the Central Governing Body of the City Parochial Foundation, one quarter by the Technical Education Board of the London County Council, and the remaining quarter chiefly by City Companies and the grants of the Science and Art Department.

Where there is so much in common it is perhaps scarcely desirable to accentuate minor points of difference, but the times at which the several institutions have been established, the characters of their respective districts, the *personnel* of their governing bodies and their chief officers, and the sources from which they have derived their chief support, have not failed to leave their mark upon the organisation and character of the institutions themselves. The Goldsmiths' Institute, though included in the original scheme of the South London Committee over which Mr. Evan Spicer presided, was ultimately established by the unaided action of the Goldsmiths' Company, and, except for students' fees and grants from the

Science and Art Department, has been entirely supported through the munificence of that ancient Guild. Established on the borders of a large residential suburb, the Goldsmiths' Institute, while not neglecting the requirements of the industrial population, is utilised, especially in its recreative and social departments, to a greater extent by the commercial classes than is perhaps the case in most of the other Polytechnics. But to compensate for this peculiarity which is almost incidental to the situation of the institute, the Goldsmiths' Company have recently established a branch institution near the river in Deptford, on the premises of Sayes Court, kindly placed at the disposal of the Company for that purpose by Mr. Evelyn, and in this institution special provision is made for the artisan and poorer classes of Deptford, in the hope that after attending classes at Sayes Court for a year or two they will be induced to take advantage of the still greater facilities which are offered in the Goldsmiths' Institute itself.

The Birkbeck Institution and the City of London College were established many years before public money was available for the work of such institutions and before the Polytechnic schemes had been thought of. As a natural consequence the social and recreative facilities which these institutions afford, are entirely subordinated to their educational work, and the sites and buildings do not enable greater facilities to be provided. The City of London College has been especially renowned for its commercial side, while in chemistry and some other branches of experimental science, it has done excellent work. The Birkbeck Institution has made a special feature of economics, and of chemistry, physics, biology, and other branches of science, which have been taught in it very largely on a university footing. When, therefore, these institutions applied to the Charity Commissioners to be treated as Polytechnics, a grant was made to them from the funds of the City Parochial Foundation, as above stated, conditionally upon their being federated with the new Northampton Institute on which was thrown the obligation to provide recreative and social facilities as well as workshop classes for the students of all three institutions. Hence it follows that the Northampton Institute itself is in a somewhat exceptional position. It is threatened with hypertrophy of the social and recreative department, while on the educational side it is under agreement with the Birkbeck Institution, and the City of London College, not to establish, at present at any

rate, any classes in science, art, or commercial subjects of the same kind as those conducted by the sister institutions. Its educational work is, therefore, almost entirely confined to workshop classes in the building trades, in mechanical engineering and the metal trades, and in artistic crafts, with instruction in those branches of science and art which are directly associated with, and spring out of, workshop instruction, while on the women's side, the institution has an unlimited field in the conduct of domestic economy classes, as well as classes in those trades which are specially adapted to women's work : an ample field, assuredly, but one which requires more careful cultivation than that of the Science and Art School.

The early history of the People's Palace was of a somewhat chequered character, but the institution was saved to the East-end by the liberality of the Drapers' Company. In consideration of their promised grant of £7,000 a year, the Charity Commissioners liberated the institution from the control of the Central Governing Body, though still permitting it to enjoy the income from the City Parochial Foundation provided for it under its original scheme. In this institution the educational department was at first little more than an appendage to the social and recreative side, and the main feature appeared to be the Queen's Hall, in which public entertainments on a very large scale were organised. The educational side, which comprises the Organised Science Day School and the East London Technical College, has now grown to such proportions as to have assumed much greater importance than the social side itself, but the two departments have been kept almost wholly separate, and the students of the Technical College, as such, have no privileges in connection with the entertainments or social side of the institution. In its complete independence of the educational and recreative departments the People's Palace is unique among the London Polytechnics.

The district in which the Borough Polytechnic was established at once gave character to the work of the institution, and this was accentuated by the appointment of a principal whose great strength lay in the organisation of workshop classes for artisans, and of the instruction in science and art incidental thereto. As a result the workshop classes in the Borough Polytechnic bear a larger proportion to the total work of the institution than is the case in any other kindred institute, while the social side forms a very important feature, which, though less indepen-

dent of the rest of the work of the Polytechnic than is the case at the People's Palace, is less intimately connected with the educational department than is the case in most of the other Polytechnics.

At Battersea the building, engineering, and chemical trades necessarily come very much to the front. The Polytechnic possesses two excellent gymnasia, one for men and one for women, but the recreative side is made subject to the educational side, inasmuch as only those students who are attending some classes in the Polytechnic are allowed to be members, and enjoy the social and recreative facilities which the institution affords. In this respect the example of the Battersea Polytechnic has been followed by the South-West Polytechnic at Chelsea, and by the Northern Polytechnic at Holloway, though, through the incomplete character of its building, the social department of the Northern Polytechnic at present consists of little more than a nucleus. At Chelsea the nature of the district has given a great spur to classes of a more advanced character, and the Polytechnic resembles a provincial university college to a greater extent perhaps than any of the other London Polytechnics.

The importance of the social side at the Regent-street Polytechnic has been dwelt upon so fully by Mr. Quintin Hogg in his paper, that it is unnecessary to do more than refer to it here. On a smaller scale the organisation of the Woolwich Polytechnic very much resembles that of the Regent-street institution. The proximity of the Royal Arsenal and other great engineering works give an essentially North Country character to the Woolwich Polytechnic, and when funds have been raised for necessary buildings, it is probable that Woolwich will possess one of the best engineering schools in London.

But for the paper just read by Mr. Quintin Hogg, a description of the work of the Regent-street Polytechnic, by far the largest educational institution in London, would have formed a very considerable portion of this paper, but the description has been given by the author of the institution itself, and it is only necessary here to remark that, notwithstanding the great development of its social side, the educational work of Regent-street Polytechnic compares favourably with that of any other institution in London.

Reference has been made in this paper to certain departments in which the educational work of the Polytechnics is, or is likely to



become, work of university character. It is not possible in this country to draw a distinct line between secondary education and university education. In most universities and university colleges much of the teaching is of a preparatory character, and at Oxford and Cambridge especially no inconsiderable portion of the students are far below the standard of the highest form in our best secondary schools. Perhaps, as the promoters of university extension contend, the real test of university education lies rather in the manner of the teaching than in its advanced character. But it is not on the strength of distinctions of this kind that it is said that some of the Polytechnic teaching is of university type. Whether tested by the attainments of the teachers, the manner of the teaching, the equipment of the departments, the proficiency of the students, or the advanced character of the subjects taught, which in some cases belong rather to post-graduate than to pre-graduate study, certain branches of the Polytechnic work can establish their claim to university rank. It does not follow that the Polytechnics themselves are to be regarded as university institutions any more than that the University of Cambridge is to be treated as a public elementary school because some of its students attend classes in arithmetic and the first three books of Euclid. University College, King's College, Bedford College, the Royal College of Science, and last, but not least, the Central Technical College, are institutions in London of recognised university rank, and the first three may be regarded as fulfilling the functions of university colleges in nearly all the faculties. It is not likely that any of the Polytechnics will put forward claims to be similarly regarded, and it may well be doubted whether they could do so without departing from the special mission which they are established to fulfil; but the colleges of recognised university rank do not provide the whole of the university teaching of London. In economics, a very large share is supplied by the London School of Economics and Political Science, in one of the rooms of which Section B is now meeting, while in special branches of science the Polytechnics will each year afford more and more of the higher teaching; and it is right that this should be so, nor need the higher colleges fear any undue competition. It is impossible that three or four institutions should supply the higher technical training for four millions of residents besides a very large number of students imported from the provinces, or should be able to deal with all the applica-

tions of science which ought to be taught in London when the higher teaching receives due recognition and its function is properly understood. Electro-chemistry will before long require a college to itself. The many branches of civil engineering cannot possibly be accommodated in any one of the existing institutions, and mechanical and electrical engineering are in nearly the same position. By each Polytechnic selecting some special subject in which to develop a department for higher work the general character even of the elementary work of the institution will be improved, while no university which professes to meet the educational requirements of London can be considered approximately complete if the Polytechnics do not receive some recognition in its scheme of organisation.

The CHAIRMAN said that as Sir John Lubbock had to leave he would call upon him now to make a few remarks.

Right Hon. Sir JOHN LUBBOCK, Bart., M.P., said that, as a Londoner, he was extremely glad to have the opportunity of saying how very deeply they were indebted to the readers of the papers to which they had all listened with so much interest. He was sure he was expressing the opinion of everyone in London when he said how much they owed to Mr. Quintin Hogg for the great and useful work he had done in connection with polytechnics. Mr. Hogg, in his paper, had paid a tribute of respect to Mr. Anstie, who had an extremely difficult task before him, and he (the speaker) thought the manner in which Mr. Anstie had succeeded in utilising the parochial funds for the benefit of higher education in London was a matter for which everyone was greatly indebted to him. He was afraid they did not always appreciate the importance of the work, and he was glad it had been recognised by the reader of the paper. The London County Council had been blamed for being rather slow in applying the funds entrusted to it for the purpose of technical education, but they felt it was a great responsibility, and it was not from any want of appreciation of the importance of the trust imposed upon them, but they felt it was much better to go a little more slowly, and to feel more sure of their ground than to spend all the money at once without giving the matter the full attention and consideration which it deserved. They had been gradually increasing the amount which was being spent for educational purposes, and in a very short time he believed the whole amount of the funds would be employed for the purpose of education. There were one or two points in which he confessed he was not quite sure that the County Council was altogether going in the right direction. Mr. Garnett had told them that one quarter of the £120,000 which was being spent annually on technical education in

London came from the County Council grants. But, of course, that was by no means the whole amount which was being spent on education by the London County Council out of the funds entrusted to it by Parliament. The Board which controlled these matters was ably presided over by Mr. Sidney Webb, but he (the speaker) would like to throw out the suggestion that they were perhaps voting rather too much of the fund to assisting children in going up to higher schools, and rather too little to the polytechnics and other educational institutions. He hoped no one would suppose that he did not value the increase of the means by which the younger children of our poorer fellow countrymen might have the opportunity of scaling the ladder, still, they had to balance the relative advantages, and although he did not know that he should go quite so far as Professor Thompson when he said that one great chemist was worth all the advantages given to children who attended evening classes, still he (the speaker) did think that we were somewhat neglecting the higher training of those who were to be the leaders of the army of industry. There was a great tendency not only in educational matters but in all other matters to go from one extreme to the other. At one time education was considered almost entirely from a literary point of view. He was one of those who had endeavoured to impress upon our countrymen that literature was not the whole of education—though, of course, it was an important part. The man who had merely studied languages to the neglect of science and other things could only be said to have half an education. Still, he rather regretted that the large fund which had been set free by Parliament should be devoted entirely to technical instruction; he hoped it would be devoted to higher education generally. Professor Thompson said that it was a mistake to suppose technical education was anything the Science and Art Department could make it. That was, however, the legal definition of technical education in this country—anything said to be technical education by the Science and Art Department was for all legal purposes technical education. That was unfortunate, for it altogether confused what technical education really was. Technical education could not properly be strained to include all that was taught under the Science and Art Department. He wished also to say a word with reference to a remark in Professor Thompson's paper in which he referred to the chemical education of bricklayers. Professor Thompson referred to the late chairman of the London County Council, and deprecated the remark made by him in which he advocated the teaching of chemistry to bricklayers. Professor Thompson went on to say:—"What is wanted in the education of a bricklayer is not a pernicious smattering of chemistry, which is out of the range of his work, though germane possibly to the trade of a brick-maker, but a widening of the training of the brick-layer in his own craft." He (the speaker) rather hoped Professor Thompson would modify the reference to a "pernicious smattering." No doubt a

smattering of anything was useless, while on the contrary a good grounding was most desirable. He did not see why a bricklayer should not have a grounding in the principles of chemistry. In that he hoped Professor Thompson would agree with him. We ought to give to all who are going to our higher schools a thoroughly sound and wide foundation, although with regard to detail we could not carry it very far. He thought we could congratulate ourselves in London upon what had been done, and what was being done. He had ventured on these few words of criticism because what brought them together was rather that they might learn from one another, and not that they might express opinions on which all were agreed. Personally, he thanked Mr. Quintin Hogg and Professor Garnett for their papers, and he thought all were indebted to them, not merely for their interesting papers, but also for the great services they had rendered, and were rendering, to the cause of education.

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## REFORMS IN THE ORGANISATION OF TECHNICAL EDUCATION.

BY PROF. SILVANUS P. THOMPSON, F.R.S.

"Recreation is not education, and social betterment is not the same thing as educational progress. Success in answering questions set in a paper is at best only a paper success; and education which is not technical is not technical education." These are the concluding words of a paper on the organisation of Technical and Secondary Education, read to the Society of Arts by the present writer on February 19th, 1890, at a critical time in the movement. Of the three reforms which those words adumbrated, one—the system of payment by results on written examinations—a system disastrous to all true technical teaching, has received its death warrant. But other reforms remain to be carried out. Indeed, there is hardly a line of what the author wrote in 1890 of which he would not urge the cogency to-day. There is still much need of the cold steel of common sense to divide the true from the sham; to discriminate between things which, though essentially different, are called by the same name; to get rid of statistical nonsense, in which progress is supposed to be indicated by the number of thousands of persons taught, irrespective of the questions as to what or how thoroughly they are being taught; and, lastly, to clear away some of the burdens cast on the technical education movement by enthusiastic but muddle-headed pioneers. A few only of these reforms can be touched upon to-day.

The first reform needed in technical education is to get rid of the misuse of the term whereby it is applied to various kinds of education about which there is nothing technical whatever. In a certain town in the North a course of lectures upon Dante and the history of Florence was given at the expense of the technical education grant. While one rejoices at the spread of culture and envies those who met week after week to hear the brilliant scholar who delivered these discourses, one must protest against the notion that they have anything to do with the promotion of the arts or industries. Education of a young artisan or craftsman in the scientific principles underlying his craft, or in the technicalities of his particular industry, is one thing: education of the dilettanti by lectures on a picturesque figure in history is quite another matter. Yet how often is the term technical education misapplied. Many use it as if it were synonymous with anything that can be taught under a County Council grant or under a South Kensington syllabus. They forget that the right use of the term depends not only on the subject taught, but on the person who is being taught. If you get hold of a young photographer, and teach him the scientific principles, optical, chemical, and artistic, of his craft in a proper photographic laboratory, that is real technical education. But give the same course of instruction in the very same laboratory to a young builder or to a young silversmith, or to a young silk-weaver, it is not technical education at all. It has nothing to do with his trade or industry. Education is technical only so far as it is directed to the training of the individual in and for his business in life. Education, I repeat, which is not technical, is not technical education.

The next point in which reform is needed, and in which it is slowly but surely coming about, is the proper adaptation of the technical training to the needs of the various industries or groups of industries. The sort of training that is right and appropriate in one trade or group of trades may be quite wrong and inappropriate in another. Technical education means a different thing in every trade or group of trades. Take the following cases. In certain handicraft industries, such as that of the zinc-worker, every man must be a skilled workman. He needs, besides a large amount of experience to be gained only in the craft itself, a certain knowledge of geometry of a particular kind. He must know something

about the properties of metals, about soldering, about corrosion and its prevention. The acquisition of this knowledge does not necessitate many years of study, nor compel attendance in any very expensive laboratory; but every man must get something of this training. Take by way of contrast the technical training required in one of the chemical industries, such as that of the manufacture of dye-stuffs. The work in this industry is carried out by a few highly-trained chemists, an engineer or two, and a large number of unskilled labourers. The industry depends in no way upon the training of the labourers. It would not be benefited to any perceptible degree by opening evening classes in chemistry for them. On the other hand, its success is vitally bound up in the possession of a few properly-trained chemists—men who have devoted three or four years at least of their lives to studying chemistry in properly-equipped laboratories. Contrast these two cases—the most extreme that occur to me. In one industry the right and appropriate sort of technical education is the training of the many by a species of not very advanced instruction, which can readily be carried out in any evening continuation school where a room can be spared for a workshop and where a teacher can be found who is himself a skilled metal worker, well trained in geometrical drawing. In the other industry the right and appropriate sort of technical education is the high training of the few in an elaborate course of study, conducted in laboratories expensively equipped and provided with appliances for research, and to which several years are continuously devoted. Either kind of education would fail to meet the needs of the other industry. The man who had spent three years in the continuous study of the higher geometry would find no place in the zinc-working industry; while the chemical factory has no use for the smatterer who has only picked up the bare elements of chemistry in evening classes. The statistics sometimes paraded to show how many hundred or perhaps thousands of students are receiving evening class instruction in chemistry, gratifying as they may be in showing the progress of modern education in science, have really nothing to do with technical education or the development of the chemical industries of the country. One thoroughly highly-trained research chemist is worth them all. What provision is made on the Continent for this higher training in chemistry may be seen from the fact that the entire establishment of the Regent-street

Polytechnic, chemical laboratory, gymnasium, swimming bath, theatre, kinematograph, and all, might be accommodated within the space provided for the chemical laboratory alone in the Polytechnic at Munich. The chemical laboratory of the Polytechnic at Zürich exceeds in contents the whole of the technical schools at the People's Palace. The chemical laboratory of Berlin is larger than the whole building of the City of London College. The physics laboratory at Zürich is considerably larger than the whole building of the Finsbury Technical College, and the cost nearly twice as much. They do not play at teaching chemistry in Germany and Switzerland, and their laboratories are frequented by earnest students. Students will remain three, four, or five years in these laboratories to work at research.

And yet, with simple facts such as these staring them in the face the builders of our technical schools and organisers of our schemes of technical instruction seem to have imagined that at every centre of artisan education there must be a chemical laboratory, and that the chemical industries of England were to be regenerated by evening chemical classes for artisans. The first sign of reaction against this extraordinary blunder is to be seen in the recently published report of the special sub-committee of the Technical Education Board of the London County Council; who after taking the evidence of a number of qualified experts, reported with regard to secondary and continuation schools that the teaching of chemistry "should be solely of an educational nature, and should have no reference to practical applications," but that "for the training of chemists who are to advance the industries of the country a prolonged course of study in the elements of physics and chemistry and in the methods of research is needed;" while for certain localised industries such as tanning, leather-dyeing, waterproofing, &c., in which chemical processes are employed, they recommend that the teaching should be concentrated "in a small number of institutes which should be thoroughly equipped for the purpose and placed under the direction of technical experts." In other words the sub-committee tell us that a complete reform is needed so far as the teaching of chemistry is concerned in our technical institutes, that in the chemical industries only the most highly-trained chemists are wanted; and that in the allied industries, like tanning, special establishments or *mono-technic* institutes are preferable.

There are of course other industries which

occupy places intermediate between these two extremes. In engineering there is wanted the kind of technical education which makes the skilled fitter, the skilled pattern-maker, the skilled turner, and the skilled draughtsman. But over and above this there is wanted the highest kind of training for those who are to manage and push forward the industry; and this training must necessarily be conducted in properly-equipped establishments, requiring the devotion of two or more years of continuous study, and for which evening courses of instruction are—save in the case of most exceptional individuals—wholly inadequate. It is obvious that the highly specialised and highly-equipped institutions suitable for the second of these purposes can only exist in a few places. Great municipal technical schools like those of Manchester and Birmingham, and important local London technical Institutes which, like that at Battersea, lie in an engineering centre, must contemplate providing for both kinds of engineering education. In some other towns there is a University College which supplies the higher engineering work; and in such cases it is simply a waste of energy for a second institution to attempt to specialize in this branch. In the textile industries again a high degree of specialisation is necessary: to train every mill-hand in the mechanics of textile machinery or in the technique of textile design is simply useless. Here and there an individual of unusual capabilities may be found; and in a wisely organised system means will be provided to train and develop special talent. The greatest difficulty in the way of such development arises out of the too often imperfect general education of the individual who shows special technical abilities.

Another most important reform is that of so utilising the facilities for instruction as to develop breadth of view and capacity in those who are trained. This is all the more vital to the future of this branch of education because of the extreme and in many cases disastrous degree to which the subdivision of labour has been pushed in many of the handicraft trades. Formerly the apprentice learned a whole trade; he journeyed about to pick up the outlying branches and widen his experience before he could become a master. Nowadays the apprentice commonly learns under a master who practises but a part of a trade, and he himself is taught only one portion of that part. In the cabinet-making industry, and in

many of the metal industries, the result is deplorable. Men grow up capable of doing but one thing, and are dependent upon a wholly different set of men or upon several different sets to finish what they have begun, or to begin the work that they receive for a subsequent stage in the process. The all-round competent hand grows rarer, and trade suffers, and workmen suffer, at every change of fashion. If judiciously directed, technical education may do much to alleviate this sad effect of the capitalistic tendencies of the past. It ought to be the incessant aim of the organisers of technical schools and classes to broaden the basis of the instruction, and to fight against the narrowing tendencies abroad. But this must not be done without discrimination, otherwise it ends in absurdities. A little more than a year ago I listened to a speech on technical education by no less a person than the late Chairman of the London County Council, in which he advocated the teaching of chemistry to bricklayers on the ground that it would be an advantage to the bricklayer to know something about the chemical causes of the differences of colour in his bricks. A grosser caricature of the aim and end of technical education could scarcely have been invented. What is wanted in the education of a bricklayer is not a pernicious smattering of chemistry, which is out of the range of his work, though germane possibly to the trade of a brickmaker, but a widening of the training of the bricklayer in his own craft. How few bricklayers know how to do tuck-pointing? How few understand properly the different kinds of bonding? How few have ever learned the simplest elements even of brick-cutting? These things they might with great gain learn, as being things truly pertinent to the technique of their industry, and as such will be taught in every well-organised building-trades' school. Take again the case of the silversmith's craft. How rarely, in the modern ultra-division of labour, can the all-round man be found. The chaser can chase but not engrave, the engraver can engrave but not chase; neither chaser nor engraver can do the simplest bit of enamel work, and neither chaser, engraver, nor enameller, can do metal-spinning or silver-casting. Yet here, one would have thought, in an essentially artistic trade, was the chance for rearing good all-round craftsmen. It is cheering to learn from the recent report of the Technical Education Board (1896-7, p. 8), that at the Central School of Arts and Crafts lately

established, the subject of gold and silver-smiths' work has been taken up "essentially as an artistic craft." "Every effort," they say, "is made to give students a broader view and practice of the craft in which they are engaged." These golden words might well be the motto of all technical instruction. It is to be hoped that it will soon be made compulsory for every technical student to take at least one accessory subject beside the immediate one concerned in his actual employment. Thus every silver-chaser might be required to learn also either engraving or enamelling; every bricklayer to learn either brick-cutting or that part of plastering that is common to the two trades of plasterer and bricklayer; every plumber should also learn lead-bossing and lead-burning. I cannot conceive of any more helpful thing to the prosperity of workmen than such a widening of their experience.

This again suggests another reform urgently needed in the organisation of technical instruction, particularly in London, namely the proper selection of subjects taught in the several technical institutes, so that they shall each be developed to the utmost without interfering in one another's work. Admirable as the idea of a poly-technic may be, as an idea, there is no question that good and sound technical instruction flourishes better in the school of mono-technic than in that of poly-technic type. Who attempts one thing well succeeds better than he who attempts everything and dabbles all round. Not one of the London Polytechnics is to-day doing as much for any industry as the tanning school is doing for the tanning industry in Bermondsey, or the leather trades' school is doing for the Bethnal-green industry. Very wisely the Borough-road Polytechnic has refused to attempt all sorts of so-called technical classes, and has concentrated itself on certain groups of trades. So also the Bolt-court School is doing an admirable mono-technic work for the printing and lithographic industry. The Shoreditch Municipal Technical School has wisely pushed its cabinet-making classes. The Battersea Institute excels in its engineering side. Without going further one may hail this tendency as a most hopeful sign. Each institute must find its own appropriate work and do it, otherwise it will inevitably drivel away in the sensations of Pepper's ghosts and diving bells, or whatever may be their modern equivalent in scientific toys. All this points to proper adaptation to the local industries as a desirable line of reform. We shall need more schools than at present we

have, but they will be schools where the work is better, more serious, more sincere. A technical institute for training reporters and journalists, and a school of foreign tongues for teaching the spoken languages of the world might well be added to the mono-technic institutes of London.

Lastly, we have got to learn how to discriminate between education which is purely secondary on the one hand, and that which is purely "universitary" on the other hand, as against that which is truly technical. It will be an evil day if ever the technical institutes, whether mono-technic or poly-technic in type, neglect their proper work and take to "preparing" their students for university degrees. If they are giving a training that is really of technical value, then their certificate of that training will be more valuable to their students than any University degree. If technical institutes cannot make their training of more use to their students than the holding of a B.A. degree, then that training stands self-condemned. As explained above, chemistry is almost the only subject in which the technical training and the university training are really comparable, and the technical training in general goes far beyond anything required for a mere degree examination. In no other subject does the proper work of a technical institute run along the lines of a degree preparation. If it were made a rule in the day departments of our technical institutes to admit no student who had not already matriculated into the university, the case might be different. Yet this suggestion is hardly within practical range. If such a rule were possible, how marvellously it would quicken the educational work of those institutes. In this connection it is well to remember that the *abiturient* examination required as a preliminary before entering a German polytechnic is vastly more severe than an English matriculation. How many students in a London polytechnic have, before entering, shown that they can pass an examination in differential and integral calculus? In Germany—and there is no mistake about it—the polytechnic schools are places for serious and responsible educational work. They do not, it is true, teach playing; neither do they play at teaching. If we wish our technical institutes to do as much for English industries as the Continental polytechnics have done for Continental industries, let us learn one thing from them. Let us make the serious instruction of the day classes

accessible to all by its cheapness, while excluding the incompetent by entrance examinations suitable to the standard attained in our existing secondary schools.

## EVENING SCHOOLS.

BY SWIRE SMITH.

Member of late Royal Commission on Technical Instruction.

At a Conference of the Mechanics' Institutes of Yorkshire in 1886 I read a paper on the above subject in which I made the following statement:—

"The magnitude of this question of evening schools expands illimitably the more it is considered, and yet if earnestly grappled with it offers the most practical and economical solution of the problem of the technical education of our artisans. There is no country in the world in which evening classes are so necessary, and can be so usefully and cheaply conducted as in England. There is no country in which they can be so conveniently attended; in no country have young persons engaged in manufacturing pursuits so much leisure."

## EDUCATIONAL CONDITIONS TEN YEARS AGO.

The ten years since 1886 have been years of great educational activity. The Royal Commission on Technical Instruction had presented its report to Parliament two years previously, and the recommendations contained in it were beginning to lay hold upon the public mind. In giving practical shape to the conclusions at which we had arrived after inspecting the schools of other countries, and inquiring into their influence upon the manufacturing industries which they had been designed to promote, and after making ourselves thoroughly acquainted with the educational organisations of this country, and their effect upon the occupations of the people, we made certain modest recommendations which at the time were considered by many educational enthusiasts to be altogether inadequate to meet the requirements of the times. We were of opinion, however, that it was better to ask for a little, with a chance of getting it, than to ask for much and have the favour refused. At that time the subject of drawing, which an education minister had graphically described as "the mainspring of the technical education of the artisan," was not taught to more than one in four of the scholars in elementary schools, and that often so badly as hardly to be worthy of the name of instruction. Elementary science fared even worse than drawing. Modelling was almost unknown; manual instruction had scarcely

been heard of—the pen was the only industrial weapon that boys intended for skilled handicraftsmen were taught to use—and domestic subjects for girls, excepting needlework, had not come within the range of practical education. The local authorities, however much they might have desired it, had no power to appropriate any of the ratepayers' money towards the development of the brains of the ratepayers in the way of providing technical instruction or contributing to technical schools.

#### RECOMMENDATIONS OF TECHNICAL COMMISSION.

The recommendations of the Commissioners dealt with the above and many other deficiencies, and it is very satisfactory that several of them have been adopted. Drawing is now taught to all boys, and usually with the aid of suitable casts and examples; modelling has been introduced in many localities; school museums have been established, and elementary science is now extensively taught with, in some instances, laboratory practice. Manual instruction is being given in the most progressive schools, and in agricultural districts the facts of agriculture are being taught, to which has been added the use of tools with practical instruction in garden plots. In addition to drawing and needlework the elements of cookery and household management are being taught extensively to girls. The above subjects influence the prospective life work of the scholars, and prepare them on becoming apprentices to take up in the evening classes the special subjects of science and art which have a bearing on their daily occupation.

#### TECHNICAL INSTRUCTION ACT.

But the most memorable and effective impulse to technical education and evening schools has been given by the passing of the Technical Instruction Act of 1889, which enables local authorities, to the extent of 1d. in the £, to build and maintain technical schools and contribute to technical evening schools out of the rates. This was followed by the Local Taxation Act of 1890, which practically handed over certain of the profits of the Excise, amounting to about £750,000 a year, to the County Councils and County Boroughs of the country, empowering them to devote, if they were so disposed, the whole of the funds towards the promotion of technical instruction. The embodiment of these simple Acts into practical legislation is silently working a revolution which is already most favourably affecting the civilisation and

industrial efficiency of all who have been brought under its influence. England is proverbially slow in the adoption of reforms, but it is satisfactory to state that already 172 municipalities and local authorities, including London and others of the largest cities, have adopted the Technical Instruction Act, while of 126 County Councils and County Boroughs in England and Wales, 111 have devoted all their funds derived under the Local Taxation Act, and 13 the larger part to that purpose, the amount last year being £724,000. The County Councils of the agricultural as well as the manufacturing districts, where in many instances not the slightest interest had been taken in technical instruction, are devoting themselves to their new duties with conspicuous energy, and although, as was inevitable, some mistakes have been made, there are many instances of most gratifying success. The public authorities that are entering upon this business are "learning by doing," and among them there is an encouraging spirit of co-operation and of friendly rivalry. The County Councils in many instances have followed their own methods without any general organisation in allocating the funds at their disposal. The most advanced have organised their areas somewhat on the model of the Science and Art Department of South Kensington, with responsible local committees, giving grants on buildings and apparatus, attendance, examinations, lectures, &c., and providing scholarships with maintenance, enabling painstaking students of the artisan class to pass from elementary day or night schools to the highest technical and university colleges. Others have distributed the grants according to population—leaving the administration of them to the various local authorities themselves—a more doubtful proceeding. Concurrently with the beneficial assistance of the county authorities, there has been an increased demand upon the Education and the Science and Art Departments, the latter of which has recently issued a new code of regulations for evening continuation schools, embracing literary subjects, languages, science and commercial subjects, covering the whole field of preparation for those in search of useful or refining knowledge. The above agencies co-operating with the School Boards, Voluntary School Managers, the Recreative Evening Schools Association, and the Society of Arts, guided in many instances by the National Association for the Promotion of Technical and Secondary Education, have put new life into

the evening continuation schools of the country enabling vast numbers of young people to rescue their school knowledge which was in many instances rapidly disappearing, to make it distinctly available as a help to the business and pleasures of life.

#### TEN YEARS OF PROGRESS.

The following figures from the report of the Recreative Evening Schools Association indicate the progress of evening schools during recent years :—

	Schools under Scholars	
Year.	inspection.	on register.
1886	841	42,423
1896	4,347	298,724
<i>Drawing was taught in elementary day schools as under :</i>		
1886	4,446	870,491
1895	20,506	2,229,718

Under the Science and Art Department the total number of students under instruction in science, art, elementary drawing, and manual instruction was in—

Year.	Students.
1886.....	1,046,793
1895.....	2,641,388

These figures give evidence of great progress during the last 10 years, amounting to a seven-fold increase in the scholars of ordinary continuation evening schools, and to more than two-and-a-half times the number of students in science, drawing and manual instruction under the Science and Art Department.

There are 70 new technical schools, which have recently been opened, involving an outlay of £768,000. There are in addition 67 schools in course of erection, or about to be erected, of which 55 are estimated to cost £756,000, the total being 157 schools, and representing an expenditure of £1,524,000. Another indication of the development and increasing popularity of this movement is to be found in the fact that the State expenditure on education, which amounted in 1872 to £1,077,894, in 1895 reached the sum of £7,644,885.

#### CITY AND GUILDS OF LONDON INSTITUTE.

A great impetus was given to technical instruction, especially in the manufacturing towns, beginning in 1876, by the organisation of classes, and by practical examinations in the application of science to the industries of the country by the City and Guilds of London Institute, comprising the Worshipful Companies of Mercers, Drapers, Fishmongers, Goldsmiths, Merchant Taylors, Vintners, Clothworkers, Leathersellers, Carpenters, and

others, which have taken such a generous and cordial interest in the promotion of this Congress.

The technological classes of the institute are held in 63 subjects representing as many trades, in which practical instruction is being given. In 1886 there were 329 classes, with 7,660 students, and in 1896 there were 1,118 classes, with 26,609 students. The increase in the attendance is not more remarkable than the improved quality of the instruction and the higher standard of the examinations during the period.

By their organisation of the above classes and by their splendid contributions to the People's Palace, and the polytechnic institutions of the metropolis, their erection and maintenance of the Finsbury Technical College, the South London School of Art, and above all of the Central Technical College for the training of engineers, industrial chemists, and technical teachers, these London livery companies have rendered invaluable service to thousands of students, and have thereby most favourably influenced the industries of the country.

#### CLOTHWORKERS' COMPANY AND TEXTILE SCHOOLS.

Nor can I, as coming from Yorkshire, abstain from acknowledging the great public services rendered by the Clothworkers' Company to that county. It is now more than twenty years ago, at a time of great depression and suffering among the textile industries that the Clothworkers' Company, of London, conceived the idea of rendering practical assistance to the wool industries of Yorkshire. Successive masters and leading spirits of the company, with the untiring assistance of their esteemed and public spirited clerk, Sir Owen Roberts, made frequent visits to West Riding towns, where they were brought face to face with the difficulties of manufacturers and operatives in meeting the competition of their continental rivals. They recognised that the weakness of our position was not due to inferiority of machinery, or of manual skill, but rather to the scientific and artistic knowledge of the competing foreigner which could only be permanently overcome by "finer knowledge" on the part of the Englishman. They, therefore, boldly and generously challenged the public spirited men of the various manufacturing centres with the offer in each instance that in proportion as they would help themselves in the erection of suitable buildings for technical instruction they would help them, not only by grants to the buildings, but by annual subsidies



towards their maintenance. And what was the result? The challenge was accepted by every manufacturing centre in the county, and it was by this practical initiative that the woollen and worsted manufacturing towns of Yorkshire and their technical schools, and to the same cause the recent progress of the wool industry is largely due. But their wise and far-seeing generosity did not stop here. At their own cost they built and equipped a central textile college as a department of the Yorkshire College at Leeds, with all the practical as well as the theoretical aids to the complete instruction of those intended for the textile industries. The new laboratory for dyeing research, which, without regard to cost, has been furnished with the most modern appliances for the prosecution of original research and for the conducting of experiments, bids fair to institute a new departure in the invention of colours and in their application to textile fabrics. In the necessary provision for the higher instruction of those engaged in the manufacture of textiles, in which this country has been so lamentably inferior to its continental neighbors and has temporarily lost some of its best business in consequence, the Textile College at Leeds stands forth as a noble institution, offering facilities for the highest technical training in the departments of weaving, dyeing, and finishing, which, so far as the wool industry is concerned, are not surpassed by those of any similar institution in the world. I am glad to be able to express the testimony of the best authorities to the fact that at the present time the wool industry of Yorkshire—both the woollen and worsted branches—is fairly able to hold its own against its competitors, and if it cannot be said that this result may be credited, entirely to the technical schools, so generously supported by the Clothworkers' Company, it is certainly due to the improvements in designing, dyeing, and finishing of the goods, which it is the aim of the schools to promote, and to the greater skill, efficiency, and energy of those engaged in the trade.

#### SUPERIOR EQUIPMENT OF CONTINENTAL COUNTRIES.

The general provision for technical instruction in this country especially in the higher branches, is as yet incomparably inferior to that of the leading continental countries. We have neither the buildings, nor until recently have we possessed the legislative means of obtaining the necessary financial aid, but perhaps at the present time our greatest

inferiority is in the lack of preparedness on the part of the great bulk of the scholars when they leave the day schools.

The humiliating confession was recently made by the president of the National Union of Elementary Teachers that with a register of 5,326,000 children last year, the average attendance was only 4,346,000, and that practically two-thirds of the scholars (many by having passed the exemption standards of the local authorities, and many more by evasion of the school laws) leave the school at the age of eleven, when their real education can scarcely have begun, and at a time when technical instruction, if offered, can hardly be understood by them.

All our efforts to bring the masses within reach of higher instruction, either in day or evening schools, will be seriously retarded while this state of things exists, and it should be the first duty of all patriots to combine in so strengthening the school laws that no scholar will be permitted to leave the day school under thirteen unless there are exceptional and satisfactory reasons for exemption. It would appear that less than one-sixth of the children remain after twelve, including the half-timers, who, on passing an easy examination at the age of eleven, are allowed to work half-day in the factories till thirteen or fourteen, on condition that they attend school on the other half.

#### HALF TIME SYSTEM.

My own experience of evening schools has been obtained in the manufacturing towns of Yorkshire, where many of the children pass through the day schools as half-timers from 11 to 13. The system is practically confined to the textile manufacturing districts of the United Kingdom, and enables boys and girls who have passed a standard fixed by a local authority, to enter a factory at 11, working half the day, and attending school the other half till they reach 13, or failing to pass the fixed standard, till 14. The system is condemned by schoolmasters and by philanthropists generally, and therefore I would like, as a practical business man, to describe it as fairly and impartially as I can. I have been associated with half-timers during the whole of my commercial life as a worsted spinner, as an employer of half-timers, and as a member for many years of one of the most progressive School Boards of the country dealing with their education. As an organiser of the evening classes of the Keighley Institute, and in being associated with many of the

important technical schools of Yorkshire, I have been brought into constant contact with apprentices and workmen who have passed through the day schools as half-timers, and being an ardent believer in the importance of their better education, for many years my firm have paid half the fees of all operatives attending evening classes. From an educational standpoint, I am of opinion that a boy or girl attending school continuously from 5 to 13, obtains a better education than if he or she, after reaching the age of 11, attended half-time at school and factory until the age of 13. And if it were a question of the withdrawal of the children from school at 11, who otherwise would attend school full time till 13, I should say that the opponents of the system would have a strong case against it. But, unfortunately, as I have already stated on the highest authority, among the schoolmasters, it is the practice throughout the country where no half-time generally prevails, for about two-thirds of the children actually to leave school entirely at the minimum age permitted for half-time factory employment to begin. The great proportion of these boys and girls "finish" their education at 11, and never enter a school again, while the half-timers remain at school for two or three years longer. It is clear, therefore, that at the present time, the factory half-timers, as a class—numbering, in 1895, 55,625 children—obtain considerably more schooling than the large proportion of the non-half-timers, and, as a matter of fact the whole of the half-timers are included in the one-third of the scholars who continue at school after the age of 11.

In the factory districts, as elsewhere, those parents who are really concerned for the educational welfare of their children keep them full-time at school till 13 or 14, although among the children themselves the system is undoubtedly popular, and many well-to-do children are half-timers. The poorest, however, are almost invariably half-timers, and in many cases the one incentive to parental interest in the child's early attendance at school is to insure its passing the standard permitting it to attend the factory and earn wages as a half-timer at 11, and it is but fair to say that from 11 to 13 or 14 no child is more regular at school, because absences must be made up from the factory half-days. The children of the dissolute and drunken parents—the residuum in factory towns—are invariably among the half-timers, and their inferior condition is often represented as the result of the half-time at the factory rather than of the ill-treatment and lack of

nourishment at the home. As a matter of fact, but for the factory wages these children would not be at school at all, but drifting many of them into crime and into habits of idleness. I have observed many instances of hardships associated with the half-time system, arising usually from conditions for which the factory is not responsible, but surely full-time at school till 11 for these children and half-time for two or three years after is better than no school at all. The children of the worsted and woollen districts of Yorkshire, where about one-fourth of the factory half-timers of the country are employed, look forward, in most instances, with avidity to their entrance to the factory, and their wages, amounting to from 3s. to 5s. 6d. per week, often form a grateful addition to the income of a family of small children. In my experience of this system I have found that half-timers have taken as good a position in the school examinations as the average children of the same ages in the country generally. I have found also that they have derived industrial advantages and valuable discipline in the factory, and that the association of the factory and the school has not acted injuriously upon them. In my own town a considerable number of the scholarships and exhibitions to the Royal College of Science at South Kensington, and to the Yorkshire College have been taken by students who passed through the half-time schools and who have also been the most zealous and often the most successful students in the evening technical classes. If we turn from the educational to the industrial aspect of this question it must be conceded that in the counties of Lancashire and Yorkshire, where three-fourths of the half-timers are engaged in the cotton and wool industries, their employment exercises an important influence in securing efficiency and economy of production and in supplementing the livelihood of some of the population who would otherwise be among the poorest. It is also a fact, which is worth noting, that among the highest skilled and most intelligent workmen of Lancashire and Yorkshire—the two counties that are at the head of the country in industrial enterprises—the overwhelming proportion began their practical training as factory half-timers. Until the regular attendance at school of all children is secured up to the age of 13, there would be no educational advantage in further limiting the half-time system. But after that time, the educational disadvantage of half-time would be properly dealt with by raising

the standard of admission to the factory so that the half-timer's education would not be sacrificed to his labour. We have to consider that the ultimate aim of education is to fit the boy who is born in poverty, for earning his living and for the duties of citizenship. The object of the school is to prepare him for his future work, and it is of the highest advantage that during his school period he should receive some practical industrial training, and for a time after beginning to work, some scholastic and theoretical study. It is the combination of practice with theory, which tends to promote the industrial efficiency of the individual and the prosperity and higher civilisation of the community, and it is in giving a practical and useful illustration of this principle that the argument in favour of half-time labour may be defended. I am of opinion that from an educational as well as an industrial standpoint, it would be an advantage in many instances to the apprentice to extend the half-time system for a year or two longer, so as to secure for him the specific technical instruction that would best aid him in his industrial career.

#### LEISURE OF ENGLISH OPERATIVES.

Although as I have shown, the overwhelming proportion of children leave school and join the ranks of the workers at an earlier age in the United Kingdom than in some continental countries, there is no country where they have so much leisure after their daily labour. In the textile trades employing young persons and women, the Factory Acts are rigidly enforced, limiting their hours of labour to 56½ per week, while in the great mechanical industries the hours of the adult men and boys above the age of 13 are more generally 54 per week. At from 5 to 5.30, and in fewer instances at 6 p.m., on five days per week, and on Saturdays at from 12 to 1, the workshops and factories are closed. In England the evening classes usually begin at from 7 to 7.30, and on Saturday the half holiday leaves all factory operatives free. In continental countries the operatives in similar industries work 66 or more hours per week, leaving the factories at from 6.30 to 7.30 in the evening, while there is no Saturday half holiday. I have frequently visited evening classes which did not open till 8.30 or 9, in order that apprentices might be able to attend after their work.

My colleagues on the Technical Commission will bear me out when I say that in every department of education in the more advanced

continental countries that we visited, we were almost invariably drawn to the conclusion that the buildings, methods, apparatus, and organisation of education were in advance of our own. When, however, we inspected workshops and factories, and learned the conditions of employment, and the wages and hours of work of the artisans, we were equally drawn to the conclusion that in these matters the advantages were on our side. Our industrial life has been founded on workshop practice, and it is in practical skill and efficiency that our workmen have excelled, and have thereby been enabled, in spite of educational deficiencies, to relax the harder conditions of long hours under which their rivals have laboured. Since the time of our inquiry, 1882, I rejoice to be able to state that there has been considerable prosperity among all the nations, accompanied by a marked improvement in the lot of the toilers, but we still retain the lead in the splendid advantage of leisure possessed by our people. But this greater leisure which is enjoyed by British operatives is purchased at a sacrifice of at least a full working day per week, and the wages thereby represented as compared with other nations, and I regret to say that in many thousands of instances the time is absolutely wasted. We can only pay for our immense imports of food and raw materials by exporting the products of our labour and skill to the world's markets where we have to accept as low a price as our competitors who possess a higher educational equipment than ourselves, and whose industrial position is every day growing more formidable. Our extra leisure may confer upon us, as in most instances I believe it does, much compensation in a renewal of force and energy on the part of our workers, but unless it can be used for promoting their higher skill and knowledge so as to improve the quality or lessen the cost of our productions, it may become a penalty that we put upon ourselves for the benefit of our rivals.

#### GREAT IMPORTANCE OF EVENING SCHOOLS.

In giving our attention to the millions whose education on leaving the day-schools must necessarily be incomplete, the organisation of attractive evening schools in which their education may be appropriately and usefully continued should be our constant care. Experience shows that the better the preparation in the day school the greater will be the demand for, and the more effective the instruction obtained in, the evening school. It is when the boy enters upon his

career as a wage earner that he realises the true meaning of education; it is only then that he begins to know what he wants, and the night school only can effectively supply the deficiency. What is absolutely necessary is that every boy in every elementary day school, in addition to drawing and elementary science suited to the needs of the locality, shall go through a course of manual instruction, and the girls through a similar practical course in cookery and domestic economy. Such training will furnish the basis of technical instruction for the artisan population. The establishment of public secondary schools, leading from the elementary to the higher science colleges and universities, cannot much longer be delayed, and these, in conjunction with the secondary, technical, and commercial schools already existing, and equipped, where necessary, with laboratories and appliances for practical instruction, will furnish such theoretical training as will materially help those of higher ability who are preparing for the more important positions in the manufacturing, distributing and commercial branches of business. In fact, the day schools, both elementary and secondary, may be compared to nurseries which prepare students, on becoming apprentices, to take up in the evening classes, and I hope in the same schools, the special subjects of science and art connected with their daily industries. Experience has already amply demonstrated that these young men, with nothing to unlearn, can return from the workshop to their familiar class-rooms, and pursue their technical studies with a measure of enthusiasm and success altogether unknown to students who have not had the same advantages of preliminary training.

It will be understood that, as practical men, we must make the most of the means at our disposal, in many instances limited, and of the material often crude, that we have to deal with. Our organisation must be as elastic as possible, not rigidly enforcing in all instances the prescribed courses. A youth often attends an evening school for specific instruction, and to compel him to go through any special curriculum would frequently drive him away. He had better learn something that has no bearing upon his daily employment than not attend the class at all; and, much as I believe in the instruction that will afford them bread-and-butter, I am at the same time always glad to see our young mechanics give their attention to literature or poetry or music. Indeed, in many instances, they may derive more intellectual

benefit and enjoyment from the study of subjects that are remote from practical application than from those which bear more directly on the means of their existence.

Through the powers which are now possessed and are being so rapidly utilised by the public authorities, taken in conjunction with the leisure of our people, the facilities for instruction in evening classes in the United Kingdom will soon be unsurpassed by those of any country. The continuation schools, to which I have alluded, the classes in science and art under the Science and Art Department, the technological classes for every trade that are promoted by the City and Guilds Institute, the university extension lectures, and courses of instruction supplied by the county colleges, such as those of the Victoria University at Manchester, Leeds, and in many other centres, are capable of untold extension and usefulness.

#### QUALIFICATIONS OF TEACHERS.

In some of the best schools on the Continent the Technical Commissioners found that the teachers were exceptionally conversant with the *practical* applications of the theories which they taught. The English teacher will have to give instruction to apprentices engaged in local industries of which he ought to know more than they, and it is important that he should keep in touch with daily usages, adopting workshop terms and methods where he can thereby the better elucidate his subject. Beyond the occasional application of scientific principles to practice there is no great need for the extensive duplicating of the machinery employed by apprentices in their daily labour. In the varied applications of theory to practice in the textile industries a more extensive mechanical equipment may be necessary, but I think that experience shows that upon the whole the evening class should supply the maximum of theory with the minimum of practice rather than the reverse.

#### VALUE OF SOUND PRINCIPLES.

In art matters also it is more important that the student should be instructed in the principles of art than that his faculty should be immediately applied to industrial purposes. Our practical manufacturers protest that they want designers and not picture painters, forgetting that the power to paint the picture carries with it the power to design, and that to limit the artist in the cultivation of his faculties is to spoil and not to make the designer. I have observed that many manufacturers would

have students taught to design textiles before they have learned to draw, or to receive instruction in dyeing before they have mastered the elementary principles of chemistry. There has been this inherent defect—this lack of artistic or scientific basis—in most of our technical instruction hitherto, which has left our students still behind many of their continental rivals. We shall, however, learn by experience that in the long run it is better that a student should be trained in art generally, and allowed to develop his imagination and taste by applying his knowledge to his particular industry, rather than, as is too often the case, he should skip the exercises and become a mere copyist of the designs of others. In visiting the continental schools that had exercised the most marked influence on manufacturing industries, the Technical Commissioners almost invariably found that the true province of the school was never subordinated to the mere teaching of a trade. In pottery, metal work, or textiles, the artistic basis of the instruction was ever kept strictly in view. The director of one of the most famous textile schools said to the Commissioners, "Pray do not call this a weaving school; it is a school of art applied to weaving;" and surely the definition was a proper one. The practice of weaving can best be taught in the factory; but art, or designing, applied to weaving, comes more distinctly within the province of the suitably equipped school with its examples of pure art and its canons of good taste; and what applies to textiles applies to all industries and handicrafts having an artistic basis. In the same way a dyeing or colour-making school would be a school of chemistry applied to dyeing or chemical industries, and the students, trained in principles and in original research rather than in the working out of recipes dictated by a professor, would ever be ready for dealing with new agencies or inventions.

#### TRADE TEACHING NOT MOST ESSENTIAL.

I have given some prominence to these elementary truths, because so many members of County Councils and governing bodies, in their enthusiasm for rapid results, would actually make it their object to teach trades in schools, rather than the underlying principles affecting our industries which it should be the aim of the schools to instil into the minds of the students. Besides, it is important that students should have some choice of subjects, so that they may give attention to those for which they may have the greatest natural faculty. To organise the

technical instruction of a locality so as to develop its special industries has been found in many instances to be a good thing. On the other hand, to organise the instruction so as to develop the special faculties of the students, has proved to be a still better thing. The former system tends to the concentration of a trade, or a branch of a trade in a given locality, and where there is such concentration there is often exceptional energy thrown into it, but there may also be irregularity and fluctuation in the employment of the people accompanied by alternating periods of inflation and corresponding depression. The latter system tends to the diversifying of the existing manufactures and to the introduction into a locality of new industries, and as it seldom happens that all are unduly busy or depressed at the same time, employment is often more regular and steady. It is idle to suppose that technical schools in small towns do not affect the industrial position of the nation. The fact is that the talent of the nation is so distributed that unless facilities for its development are provided in the smaller places much of it will be lost for ever, but, on the other hand, when once trained it will be available for the world.

#### FACILITIES MUST BE OFFERED TO ALL.

It has been said by the critics and those candid friends who are ever ready to throw cold water on this movement, that the value of technical education first comes in with those "who emerge from the class of manual workers," the directors of labour, the foremen or those who work more with their brains than with their hands; and that while it may be prudent to spend public money on the training of the talented, it is a waste of money and of effort to attempt any widespread diffusion of technical education among the ordinary workmen. But our critics have never pointed to any method whereby the few may be selected from the mass. The sifting process must begin among the young, and it is not revealed to us when we see the children at the school, or even the apprentices at the workshop, to distinguish those who will be the future brain-workers or foremen. Professor Huxley said it was worth spending a million to discover a Faraday, and so to find the specially capable we must give facilities to all who will come. It must also be noted that it is not usual to find the foreman or even the adult workman in the class-room. By the time that he has risen to a leading position he is no longer a student. In my own experience—going back many years—of the

organisation of evening classes in my own town that have been attended by thousands of artisans, I find that in the engineering shops, the building trades, factories, and large industrial establishments, the foremen, draughtsmen, brain-workers and many employers now in middle life began their career as apprentices in the lower ranks of labour. But nearly the whole of these industrial leaders passed through the evening classes of the Keighley Institute 10, 20, or even more years ago, and if the technical classes in those days had only been open to foremen and brain-workers they would have been excluded. The students of to-day are youths and young men, most of whom are probably ordinary apprentices and workmen, but I have not the slightest hesitation in saying that from their ranks the future brain-workers, foremen and employers in their various industries, will rise, and those who may be destined to remain in the rank and file of the industrial army, will be all the better as men for the wider cultivation and refinement which they obtained through their studies and reading.

#### UNIVERSAL ADOPTION OF TECHNICAL INSTRUCTION ACT.

It seems to me that the great opportunity presented by this Congress, is that it should exert its unique influence in securing for every municipality and local authority throughout the country the advantages which are offered by the adoption of the Technical Instruction and Local Taxation Acts. The ratepayers of the United Kingdom, like their continental neighbours, will thereby be enabled to levy rates for developing the artistic, scientific, and industrial faculties of their young people. After what I have seen in other countries of the wise use and beneficent results of those powers, I am convinced that there is no investment of public money that will so increase the industrial efficiency of the individual, or give so powerful an impetus to the productive agencies and commerce of the nation as the establishment of a sound and appropriate system of technical instruction, in day and evening schools, in every town and village in the country. And in advocating such a movement, I can appeal to those of our guests who have had long experience of its influence in other countries, and who in this, as in other branches of education, have exhibited courage and patriotism far beyond our own in making sacrifices for its advancement. I trust that this Congress will show that whatever may be the rivalries of commerce, we are

all at one in our desire for the intellectual improvement of all our peoples, for in the promotion of civilisation, and of the arts of peace, the attendant prosperity and happiness will be shared by all.

Sir PHILIP MAGNUS said they were very much indebted to Professor Thompson for his paper, if for no other reason, for the argument he had furnished for giving facilities for technical instruction to all workmen throughout the country. With regard to polytechnic institutes, they had heard a great deal about the necessity of co-ordination, and he need scarcely say that where a large number of polytechnic institutes, such as those in London, were coming into existence, some need of co-ordinating the work became necessary. At first they were supported almost entirely by the grants of the Science and Art Department, the fees of the students, and the grants of the City of London Institute, but after the scheme prepared by Mr. Anstie it was thought advisable that a central governing body should take the government into their hands. Later on, a large sum of money came into the hands of the County Council which they were able to use for this purpose, and the main development was, therefore, left to the County Council. But it became very desirable that these bodies, which were providing funds for the institutes, should work in harmony with each other to effect some co-ordination, and that co-ordination was mainly effected by what was known as the London Polytechnic Council. In consequence of the action of this Council much of the co-ordination to which Professor Thompson had referred had actually been carried out. That Council existed for the purpose of preventing the over-lapping of instruction, and it was largely owing to the efforts of the Council that many of the reforms which Professor Thompson suggested had already been carried out, and several of these polytechnic institutes were now giving special advanced instruction peculiar to the district in which they were situated. In a city like London, which consisted of over 4,000,000 inhabitants, there was room for a large number of institutions, each of which was doing the same work in connection with a number of different trades. These institutions were situated in localities larger than many provincial towns, but one thing the Polytechnic Council thought most desirable was that the higher teaching which was given in connection with these institutions should be localised, and there should be no attempt made to duplicate it. The consequence was, that whilst one institution had its leather tanning school, another had its cabinet-making school, and another its electrical engineering school, and thus duplication of the work was not permitted. Another object which the London Polytechnic Council had in view, and he believed had been successful in carrying out, was the prevention of what was generally recognised as a great evil—the multiplication of examinations by different bodies. The

London Polytechnic Council exercised control over all the polytechnic institutions to that effect, indicating what kind of examinations the several institutions should take; and it had thus succeeded in establishing harmonious relations between the various institutions, which all now worked, not for their own good only, but for the good of the working population of the whole of this vast city.

Mr. GEORGE HOWELL said he should like to accentuate what had been so ably said in Professor Silvanus Thompson's paper. He had attended the Conference each day, and he had looked around to see whether he could find any of what were usually called the representatives of industry present. During the three days he had only discovered two besides himself—one a late well-known member of the London School Board, Mr. Lucraft, and the other Mr. King, of the Bookbinders' Society. That did not look very well, so far as appreciation of the efforts was concerned, that were being made to improve workmen in the matter of technical education. Still, there was no doubt we were making great progress in that direction. But he felt that our working men, more particularly, were somewhat afraid that they were making this movement too much a movement for the education of the higher sections of the people, and not so much for the actual artisans. Professor Thompson, in his paper had alluded, among other things, to the division of labour. He should probably startle some of them when he said that no one in the boot and shoe trade alone could make a boot. Not very long ago he asked two experts into how many sections the making of a boot or a shoe was broken up for the purpose of trade. One told him 85 and the other about 120. But, supposing it was only 50, that was something very different from what it was some years ago—say at the commencement of the Queen's reign—when a man had to sit down and make the whole of the boot from beginning to end; or sometimes the uppers were done by one hand and the soles by another. That same process was going on in a variety of industries; and it seemed to him necessary to educate our workmen in the general principles of the trade to be followed, and not only the one particular section at which he might get his living. There technical education would come in and supply the place of what was going out—the old apprenticeship system, to which we could scarcely go back. The building trades were not broken up into so many different elements as boot and shoe making. The bricklayer, the carpenter, and the plasterer each had his own separate work. There was a time when the bricklayer did the plasterer's work, but he must not do it now; the line of demarcation had increased, and if the bricklayer were to do the plasterer's work there would be a strike. There were, however, many things in connection with the bricklayer's trade which it would be well for him to learn; and whilst it might not be very advantageous to teach the bricklayer the chemistry of the

colour of bricks, he might be taught another branch of chemistry, which would be of very much greater importance to him, viz., the influence of the acids in the mortar or cement on the bricks. These acids discoloured the bricks, and hence sometimes no sooner was what was designed to be a very beautiful building erected, than one saw corrosion of one kind and another all over the work, and that was because the bricklayers did not understand the action of the cement or mortar upon the bricks. Such things as these were elements in technical education which might with advantage be taught to the practical mechanic. What they had to teach him was such things as would enable him to perform his work in the best possible style.

Mr. HOWARD SWAN said he had been occupied for 14 years in what was really a technical institute, founded by Mr. Ruskin, at Sheffield, and he would like to draw their attention to the fact that there existed in Sheffield a unique technical institute, in which were specimens of the highest technical examples of sculpture, wood-carving, water and oil-colour painting, ceramic work, and also poetry and literature. However well the plumbing and bricklaying might be done, we should still strive to have more beautiful architecture for our buildings, and when we had the buildings we wanted beautiful ornaments to put in them, and then we must have beautiful men and women to occupy the buildings. Mr. Ruskin's great aim in starting this institute or museum was to prove that it was possible to become an "artist in human clay." As a result of the influence and training received at Sheffield the speaker mentioned the work of a Sheffield grinder, who had a faculty for manipulating clay, and had turned out some extremely interesting clay work. Under the influence of Mr. Ruskin and his (the speaker's) father, this man had developed into an extremely clever sculptor; he had exhibited his work at the Academy, and had become the principal of the School of Sculpture at Birmingham. Another instance was that of a young cabinet maker who, largely under the influence of the pictures Mr. Ruskin had presented to the Sheffield Museum, became a masterly water-colour artist. In concluding his remarks, Mr. Swan said he felt convinced that even literature could be made a technical subject, and that people could be trained to write good essays, good reports, and even good text-books. Those who were teachers would know what that would mean. The influence and training of such institutes as that at the Sheffield Museum would enable them to reach the highest point to which they could go in technical education.

Professor J. VIRIAMU JONES, F.R.S., remarked that he was a little surprised to hear Mr. George Howell speak as if the Conference devoted itself too much to the consideration of higher technical instruction and too little to the consideration of the instruction of the artisan. Personally, he thought they had heard too

little about the higher technical instruction in the provinces. The higher technical instruction in our great provincial towns was given by the university colleges. He referred to that because Professor Thompson, in his admirable paper, seemed somewhat to discount university influence in technical education. He (the speaker) thought it would be a great mistake if we committed ourselves to a set of technical institutions disconnected from the universities. From the earliest dawn of education in Europe, universities had been technical institutions. The original faculties were those of medicine and civil law. But why should higher instruction in engineering be regarded as more outside the province than instruction in medicine, or instruction in the profession of law. University colleges had already shown what they were capable of doing in respect of technical instruction. The problem of dealing with this question was more difficult in London, owing to the vast population, than it was in a provincial town; but matters in London were enormously complicated by the fact that we had not a teaching university. He was glad to have had the opportunity of referring to the technical work of the university colleges, because he looked forward to the day when an enlightened Chancellor of the Exchequer would see the possibilities in connection with such institutions. If a system of higher technical instruction was to be developed throughout England it could most easily be done in connection with those institutions. When he heard of the large sums of money which were being spent on the Continent, and the magnificent development of their technical institutions, he could not help hoping that before very long we should see our university colleges released from their financial difficulties, and able to do what he was sure they could do—develop a system of higher technical education quite comparable with that which existed in Germany and other countries on the Continent. He sincerely hoped that we should see before very long a great teaching university in London, which would be able to do for this vast population what he looked forward to the university colleges doing for technical education in the towns in which they were placed.

Mr. SIDNEY WELLS (Principal Battersea Polytechnic) said he wished to say a few words on one or two points arising out of Professor Thompson's paper. On the principle that a little practical experience in these matters was worth as much as a great deal of theory, perhaps what he was about to say would carry as much weight with the Conference as the opinion of so distinguished an educationalist as Professor Thompson. Professor Thompson in his paper seemed rather to deprecate the teaching of chemistry to chemical workers. In Battersea there were very large chemical industries, and, during the past year, the employers of one of those large factories—Price's candle factory—had paid the class fees of a number of their ordinary apprentices—not their skilled chemists—in order that they might attend the evening

chemistry classes at the Battersea Polytechnic. When they saw a firm, whom they might suppose understood the value of that kind of thing commercially, doing that, and when they saw the lads willing to attend the classes after working all day in the factory, he thought it said something for the need which not only the employers but also the employees felt for technical education. Polytechnics, at the present time, were trying to give that training which the sub-division of labour made it so impossible for a mechanic to obtain. If an engineering student attended their workshop at Battersea, and they found he was only allowed to work at the lathe all day, they allowed him to work at other machines in order that they might make a more complete and thorough workman of him. Another point was the absolute necessity for polytechnics to do some special work, and the danger of their all trying to do everything. But they must remember that the London polytechnics were not like similar institutes in provincial towns. At Battersea there was a population of a hundred and fifty thousand people, mostly belonging to the artisan classes, living within a square mile of the Polytechnic. Under these conditions they could afford to teach many subjects without fear of overlapping other institutes two or three miles away. It was quite unreasonable to expect a student living in Tooting or Balham to journey three or four miles for evening classes after he had done a hard day's work. Then Professor Thompson hoped the London polytechnics would not try to train their students for university examinations. He (the speaker) hoped that the polytechnics would certainly not be led away by the glamour of higher university teaching. They would continue to believe that they were doing a great and much-needed work if they reached the artisan classes. But there were two sides to this question. What about the elementary school teacher and similar young men who were working all day for their living, and could only attend evening classes, and yet still wanted to obtain a university degree! The higher colleges in London were not open for the reception of such students, and if they were it was unreasonable to expect that an elementary school teacher, living at Tooting, was going to journey to Kensington for his classes; and the polytechnics felt they were doing a good and a right work in endeavouring to meet the needs of these young men and women by providing evening classes that would enable them to take university degrees, and thereby help them in their life's work.

Professor BODINGTON thought university teaching and the higher technical teaching should not be disjointed; the training of the artisan should not be separated from the man of science. He thought our university colleges should be opened to the artisan with the same freedom as the polytechnics. He should like to see scholarships offered in connection with the university college and higher places of education so



as to make it possible for all to take advantage of them in some way as the German universities could be taken advantage of. That was a long way off at present. Meanwhile, the university colleges were struggling with financial difficulties—difficulties which he knew the Chancellor of the Exchequer was approaching in a very small and inadequate way, but at the same time they were grateful for the recognition they had had.

Dr. R. M. WALMSLEY understood that the chief object of a technical institute was to broaden the views and capabilities of the workers. Everyone knew that under the present system of subdivision of labour a sudden change of fashion might throw whole establishments of workmen out of work and on to the parish if they could only perform the one branch of work with which they had been connected all their lives. One of the main objects of the technical institute was to train workers in the cognate branches of their trade, so that when a change took place they might be able to take up another branch, and so be able to continue to earn their bread. He was glad to be able to inform Professor Sylvanus Thompson that in the Northampton Institute chasers were learning engraving and engravers were learning chasing; and throughout all the classes they proposed to make the student acquainted with more than one branch of his trade.

Mr. EDRIC BAYLEY said he attended the Congress principally to ask two questions. The first was: how can we get employers to take more interest in their work-people? and, secondly, what can we do for women's labour. With regard to the first point, Mr. Wells had told them of a firm at Battersea who paid the fees for some of their apprentices to attend chemistry classes. There was one trade in London, and he believed the only one, viz., the printers' trade, many of whom gave their apprentices an hour off to enable them to attend evening classes, and also paid their fees. Employers in the North of England were more public spirited. He wanted to know whether this Conference could help in any way to induce employers to take more interest in their apprentices. Coming to his second point, he said women's labour was in such a disorganised state that it was difficult to do anything effectively. They had tried to start classes in book-binding and upholstery for women, but they failed to get anyone to attend. He believed the reasons were the long hours, bad wages, and the bad conditions under which they had to work. Until they could get women to form trades unions, so as to secure for them shorter hours, better wages, and better conditions, they would never be able to make technical education of much use to them.

The CHAIRMAN said owing to the lateness of the hour it would be impossible for him to in any way sum up the results of all that had been said. They had had a most interesting discussion. It had wandered from the very lowest branch of technical education up to the highest instruction given in the

universities. Undoubtedly, one of the problems of the future was how to weld together and make part of one system the whole of the teaching which was given in connection with technical training. He thought they would have to realise that the training of the higher leaders of industry, the skilled directors of others, stood on a different footing from that of the humble worker, who carried out only what he was told to do. He did not think Professor Thompson would wish to discourage the increase of intelligence or the increase of curiosity with regard to the work of the artisan. They wanted him to take the greatest possible interest in his work, to understand at what he was driving, and, as far as possible, to reason upon every process of which his own was only one of the smaller parts. What was the character of good artisan education, how far it should be specialised, was not a subject of unanimous agreement. One of the advantages of such a Conference as the present was that these difficulties, and the objects at which the leaders of industry and the leaders of technical education were aiming, were brought before a very wide and varied body and he could not help believing that before we arrived at any definitely recognised system in the various branches of technical education, a very large number of experiments would be necessary—experiments some made in provinces and some in London—but when the result of those experiments had been gained, he thought they would be able to say that the burst of educational enthusiasm which the latter part of the reign of the Queen had seen in England, had had its effects not only upon the education of our work-people, but upon the commercial and manufacturing predominance of England itself.

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#### THURSDAY AFTERNOON, 17TH JUNE.

##### SECTION A.

WILLIAM WOODALL, M.P., in the chair, followed by Lord BELHAVEN and STENTON.

#### THE DEVELOPMENT OF TECHNICAL INSTRUCTION IN SECONDARY SCHOOLS UNDER THE PROVISIONS OF THE TECHNICAL INSTRUCTION ACTS, 1889 AND 1891, AND THE LOCAL TAXATION ACT, 1890.

BY H. MACAN, M.A.

(Organising Secretary to the Surrey County Council, Hon. Sec. to the Association of Organising Secretaries.)

My object in presenting to the International Congress this survey of the progress made during a period of about five years in one portion of the educational field, is not so much to show the great change in curricula, and the alteration in aim of the teachers, which has affected those who were expected (and most of whom hoped) to be impervious to such

influences, but rather, on the eve of a great administrative change, to point out to the interested politician what influences have been at work in shaping those ends rough-hewn by his legislative machine.

To persons acquainted with English methods of progress, and more particularly with the absolute indifference to education which is characteristic of the masses of the people in this country, it will not be a matter of surprise if I say at the outset that this paper deals with an important educational development never contemplated by the Acts of Parliament under whose cover it was carried out.

The agitation which was carried on throughout the country in the three years preceding 1889 on behalf of a Technical Education Bill, and in which the present Duke of Devonshire, Sir Henry Roscoe, Sir P. Magnus, Mr. A. H. D. Acland, and Mr. Llewellyn Smith were the leading figures, was certainly understood by the public at large to aim almost entirely at providing manual instruction in connection with our elementary school system, and some specialised technological instruction chiefly by means of evening classes for persons who had passed the school age. In fact the situation as then understood may be summed up in the words of the second report of the National Association of Dean's-yard expressing regret that "no progress seems to be possible towards solving the question of the provision of technical instruction for the children of the working-classes in *elementary schools*;" and in the resolution of the Head Masters' Conference, 1888, that "the true solution of the problem of higher technical and commercial education is to be found in continued study of a specific kind on the part of those who have left school."

To what, then, are we to attribute the fact that the powers under the Technical Instruction and Local Taxation Acts are at present being used very largely for the improvement of scientific and commercial education in *secondary day schools*?

In the first place, no doubt largely to the action of the National Association in including in its programme (though it was not in the forefront) "the development, organisation, and maintenance of a system of secondary education throughout the country, with a view to placing the higher technical and commercial education in our schools and colleges on a better footing." Perhaps a more important factor still was the passing of the Welsh Intermediate Education Act in the same year as the Technical Instruction Act. This gave

to Wales the full powers still denied to England, and the vigorous way in which it was put in operation directed the attention of thoughtful men to its provisions, and made them desirous to emulate its results in this country, even with the imperfect machinery at our command.

The circumstances under which Sir W. Hart-Dyke's Technical Instruction Act itself was passed contributed to the same end. Finding it impossible, for reasons which have been fully apparent in the present Session of Parliament, to attempt to deal with the whole question, he decided to drop all reference to technical instruction in *elementary* schools from his Bill, and even to deprive scholars in the standards of all its advantages. At the same time, by constituting (as a natural corollary) other (*i.e.*, non-elementary) bodies, namely, the municipal councils of counties, boroughs, and urban districts, the authorities under the Act, rather than school boards and school managers, a class of persons was imported into the educational field whose instincts and experience lay rather in the development of secondary than of elementary technical education.

But the most potent influence of all in diverting the purposes of the Act was the change which was coming over the spirit, the aims, and the work of the Science and Art Department.

This body, to whose work as the pioneer of technical education I desire to bear testimony, was formed originally for purely industrial purposes, and for "extending knowledge of design (afterwards of science also) among the manufacturing population of the country." It naturally proceeded at first by means of evening classes for adults and semi-adults; but these classes became gradually used by *younger persons*, and, as a result of the Education Act, 1870, School Boards developed an ambition (highly laudable in the absence of legitimate machinery) to connect the work of their upper standards with the work of the Department. Thus came *day* classes. Special schemes for instruction in these were promulgated in 1872; thence arose the Organised Science School, a great advance—and its successor of to-day, the "School of Science." (What is really meant by this misleading title is the science side or section of a general secondary school.) This new development made little progress until 1883, when there were only five of these schools presenting for examination 256 students. At the present time

there are in the United Kingdom 156 of them with 18,560 day students. The most rapid increase has taken place since the beginning of 1895, when Mr. Acland's celebrated new rules (Form No. 201) came into force. By these, result grants were largely replaced by liberal inspection grants, and literary instruction, "Essential for a good general education," found its place in the official time-table; at the same time, by a curious coincidence, the limit of income of the grant-earning classes was by the new Income Tax Act raised to £500 a year. The anticipation of the late Royal Commission that the increase would be by "leaps and bounds," has been fully verified, for while in 1892-3, the total Organised Science Schools (in England alone) was 64, and in the year the Commission reported 98, it has now reached the number of 137.

The total grants earned by the schools under the Department in 1894-5 was £143,000 a year; it has now reached nearly £253,000. As the Royal Commission put it, "In respect of these grants, though they were not originally made to schools, or even to education given in schools, yet the tendency in our legislative and general changes in education has been to render them grants to scholars in schools." And again, "This sum (spent by the Department) virtually goes in aid of secondary education, and a large part of it is spent in day schools."

Thus, by a natural evolution, the industrial Department for the continuative evening education of the labouring classes became one of our central authorities for aiding the secondary education of the middle classes.

When, in 1890, the County Councils first came upon the scene, and were presented with (in England alone) over £700,000, which they might devote to technical education, it is not to be wondered at that the attention of many of them was drawn at once to the operations of the Science and Art Department.

They were inclined to regard the work of that Department from three points of view:—

1. As a terrible example of what to avoid.
2. As something entirely good in the *original* conception of its object, namely—as a means of elevating the working man.
3. As a study in development, teaching County Councils to begin where it had ended, and continue what it had begun.

I may dismiss from consideration the first point of view, which merely arose from a mis-

taken regard to excrescences upon the Department, rather than to its essential position and work, and which is now, thanks largely to the efforts of Captain Abney and the expert inspectors appointed by Mr. Acland, seriously held by nobody except a few schoolmasters, whose schools have received bad reports and low grants. The crudeness of the old science syllabuses; the evil effects of payments upon purely elementary results; the concentration of inspection in the hands of retired military persons, lacking alike in knowledge and suavity; and the predominance of (farmed) classes under the control of teachers with minimum qualifications, have all now passed away, and there is no longer any excuse for any local authority adopting an attitude of hostility to the Department in the development of its technical instruction scheme.

Theory No. 2, the old days of the Department, or the "working man" theory of technical education may be contrasted with No. 3, the new Departmental, or "talent catching" theory; it is the conflict between these two which explains the diversity of practice between various counties with which I propose to deal, and which more than anything else calls aloud for legislation.

It must be premised that there is nothing incompatible between the two points of view as regards the administration of the technical instruction funds. It is quite possible, as has been shown in all the most enlightened counties, to devote a sum equivalent to a  $\frac{3}{4}$ d. rate to continuation school and evening class education, and a sum equal to  $\frac{1}{4}$ d. rate to technical secondary education; the former touches those classes generally, which work mainly with their hands in the day time after 13 years of age; the latter interests the middle classes, whose children remain at school until at least 16 or 17 years old, but also leads into the higher sphere the more capable children of the former class. I do not propose to discuss the limits, legal or otherwise, placed upon the operation of County Councils by the Acts, as this will be dealt with fully by my friend Mr. Turner. I will only say that every subject taught in a secondary school, except Latin, Greek, and English Literature, has been sanctioned by the Department as a fit subject to receive aid from County Council funds, and that there is not one word in the Acts limiting their provisions to classes of an elementary kind, to the instruction of any social grade of the community, or to persons with any limit of income.

However, in many parts of England still, no aid is given to secondary day schools towards providing technical instruction, and no scholarships are available, specially tenable at such schools; this fact explains what must be otherwise inexplicable to the stranger, namely the different attitude towards the technical educational movement, and towards the local authorities, and the differences in the very conception of the meaning of "technical" which is taken by head masters and other high educational authorities in various parts of England.

Three important pronouncements have been made at various times directing the attention of County Councils to this particular aspect of the subject and to the claims of secondary schools upon them.

The first is contained in the 38th report of the Charity Commission, dated 21st of February, 1891, and is as follows:—

"The provision made by the Local Taxation (Customs and Excise) Act, 1890, for the distribution to County Councils of certain funds dealt with by that Act, with power to contribute the same for the purposes of technical education within the meaning of the Technical Instruction Act, 1889, has an important bearing upon our work under the Endowed Schools Acts. It has recently been announced that this provision, or its equivalent, if utilised for educational purposes, may not improbably be rendered permanent. In view of the magnitude of the funds thus made available for educational purposes, and to the degree in which secondary education, both technical and general, has been provided in schools which are within our jurisdiction, the proposed appropriation of these funds, whether in aiding existing institutions or in founding new ones, must materially affect the fortunes of these schools, and the character of the education to be given in them. Technical instruction, as defined in the Act, means instruction in the principles of science and art applicable to industries, and in the application of special branches of science and art to specific industries or employments. It is true that this definition is extended so as to include a large part of what is usually considered to be secondary instruction in its general sense, such as, among other things, the teaching of modern languages; but in the intention of the Act, and as a starting point for its administration, the application of these funds is thus limited to a section only of the field of secondary education, and to secondary education regarded in a particular aspect.

"There is, however, evidence that a desire exists to take a wider view of the subject, and to give assistance to secondary education as a whole.

In Wales, where two alternatives were given—that is to say, to appropriate this fund either in aid of secondary education generally under the Welsh Intermediate Education Act, 1889, or under the Technical Instruction Act, 1890—it is the first, and not the second, alternative that appears to be the more favoured hitherto. Even in England we have received proposals, in more than one instance, from County Councils, for the reorganisation of particular endowments within our jurisdiction, in connection with grants to be made from this fund, where the institution to be aided is not exclusively employed in giving technical instruction, and is not intended so to be. Under these circumstances it appears desirable that, in any future appropriation by Parliament of equivalent funds in England, the limits of appropriation should be defined so as to cover the whole field of secondary instruction suitable to the class intended for benefit, and not merely that of technical or manual instruction, however widely the term may be extended by definition."

As a first result of this advice, we find in the next report (Feb. 23, 1892) the following reference:—

"We have readily entered into a large project promoted by the County Councils of Kent and Surrey for the establishment of a fully-equipped College and School of Agriculture."

And

"Apart from the project above referred to, the County Council of Surrey have determined to aid the endowments of several grammar schools within their area by yearly grants varying from £150 to £250 a year, conditionally upon the due representation of the Council upon each governing body. A draft scheme is now in progress providing for the required enlargement of the several governing bodies and otherwise adapting the schools aided to the requirements of the Council in respect of the provision for scientific and technical instruction."

(Opposed as I am to any mention or exaltation of one's own county so common in papers and speeches in this connection, I may perhaps be pardoned for this one instance, as there happens to be no other available.)

The second typical allusion by an outside authority to this branch of County Council work was in the Report of the Royal Commission on Secondary Education, dated August 13th, 1895, where it is pointed out that

"Without infringing the provisions of the Technical Industrial Acts, a large proportion of the county funds are already being spent directly or indirectly in the maintenance and improvement of Secondary Schools,"

And

"County Councils have generally found it unwise, if not impossible, in dealing with children of school age, to treat technical instruction as a thing separate from general secondary education,"

And again,

"An immense impulse has been given to technical education (under the Local Taxation Act), and as that term has been extended to cover the whole field of mathematical and physical science, as well as modern languages and some departments of geography, while grants have frequently been made to schools giving a general liberal education, the impulse has been felt in many branches of secondary instruction."

Finally we have, as the matured judgment of experts upon the real question at the bottom of all technical education in any country, *i.e.*, how far it is being kept abreast of what is going on elsewhere, the report in December, 1896, of the visit of Sir P. Magnus and his colleagues to Germany. A few extracts from this will suffice :—

(a). "Much more is being done for the training of those destined for the *higher* ranks of industry in Germany than in England."

(b). "Our recent visit has also impressed us with a sense of the advantages which the nation (Germany) derives from having an organised system of secondary education."

But on the other hand

(c). "We have no reason to think that better facilities for technical and scientific teaching are offered to foreign *workmen* than those within the reach of our own industrial population."

These three sets of opinions just quoted appeared in the beginning, at the middle and the end of the purely technical legislation movement, and are intended to show how little excuse there can be for those who still consider that the "working man" theory covers the whole ground, or that it is any longer possible to resist the lesson drawn earlier from the development of the Department of Science and Art that technical instruction cannot and must not be organised apart from secondary education.

In the first two years of the operations under the Local Taxation Act, direct aid to technical instruction in secondary schools was given by the following counties and county boroughs :—Reading (b), Cumberland, Derbyshire, Devonshire, Durham, Essex, Gloucestershire, Bristol (b), Herefordshire, Hertfordshire, Canterbury (b), Burnley (b), Bury (b),

Liverpool (b), Manchester (b), Leicestershire, Lincolnshire (Lindsey), Norfolk, Northamptonshire, Oxfordshire, Peterborough (Soke of), Somerset, Southampton (b), Staffordshire, Wolverhampton (b), Surrey, Sussex (East and West), Yorkshire (East Riding), Hull (b), Yorkshire (North Riding), Yorkshire (West Riding), Middlesbrough (b), Bradford (b), Huddersfield (b), Sheffield (b).

In the following year (1892-93) the above-named authorities were joined by Bedfordshire, Cambridgeshire, Cheshire, Lincolnshire (Kesteven), and Northumberland.

In the year 1893-94 to these were added the following :—Berkshire, Nottinghamshire, Shropshire, Ipswich (b), Westmoreland, and Wiltshire.

In the year 1894-95 Dorsetshire, Isle of Ely, Huntingdonshire, Kent, Lincolnshire (Holland), London, Middlesex, Northampton (b), Newcastle (b), Hampshire, and Warwickshire, made direct grants ; but a few others fell away.

Among the minor authorities (non-county boroughs, &c.) Banbury, Northwich, Dewsbury, Doncaster, and Wakefield have at one time or another given similar assistance.

No addition in 1896 has been made to the ranks of the authorities named above, but two have fallen away. At present no direct aid to secondary schools is given by the following :—

#### Counties (9).

Buckinghamshire,\* Cumberland, Cornwall, Lancashire, Rutland, Suffolk (East and West), Isle of Wight, Worcestershire.

#### County Boroughs (44).

Birkenhead, Chester,\* Stockport, Derby, Devonport, Exeter, Plymouth,\* Gateshead, South Shields, Sunderland, West Ham, Gloucester, Canterbury, Barrow, Blackburn, Bolton, Bootle, Barry, Oldham, Preston, Rochdale, Salford, Wigan, Leicester, Grimsby, Lincoln, Norwich, Nottingham, Oxford,\* Bath, Portsmouth, Henley, Walsall,\* West Bromwich, Wolverhampton, Croydon, Birmingham, Coventry, Dudley, Worcester, Middlesbrough, Halifax, Leeds, York.

Thus of the 49 counties 9 alone give no direct aid to secondary schools. Of the county boroughs 44 give no aid. While of the sub-

\* Capitation grants offered.

\* These have organised some day technical schools of their own.

ordinate rating authorities (214 boroughs and 728 urban districts), 180 of which raise a rate and 200 have grants to expend practically at their discretion, only five directly aid secondary schools in their districts.

It is not within the scope of this paper to draw an obvious moral.

As a summary of progress the figures of the total grants made may be set out thus:—

*Grants given by County and County Borough Authorities in England to Endowed Grammar and other Secondary Schools during the years 1890-96.*

		Authorities.
2 Years { 1890-91 } £23,581 to all secondary		
{ 1891-92 } schools, .....	by	36
Year 1892-93 .. £22,031 to all ditto, ..	by	41
Year 1893-94 .. £15,323 to endowed schools,		
+ (about) £7,000 to or-		
ganised science schools, by		47
Year 1894-95 .. £32,521 to endowed schools,		
+ (nearly) £10,000 to or-		
ganised science schools, by		54
Year 1895-96 .. £45,000 (about) to all		
schools, .....	by	60

#### NOTES.

It is important to notice that while the above figures, as far as taken from the Return of the Department, relating to the years 1893-4 and 1894-5 include only the grants made to endowed schools, which are governed by schemes established under the Endowed Schools Acts, the figures relating to the previous years include grants made to all types of secondary schools (endowed, organised science, and otherwise). This will therefore explain the apparent decrease in the total sum spent on these schools during the year 1893-4. The figures are not given separately in the two first Returns.

The figures relating to organised science schools and the figures for 1895-96 are calculated from unofficial sources.

The most liberal aid is given by the following counties:—Derbyshire, Devonshire, Dorsetshire, Durham, Hertfordshire, Kent, Lincoln (Lindsey), Somerset, Hampshire, Surrey, and Yorks (East and West Riding).

Great advances in this direction have recently been made by Middlesex, Herefordshire, and Shropshire.

The nature of the assistance may be briefly stated as follows:—

- (a). Providing teachers of science.
- (b). Fitting laboratories or providing apparatus.
- (c). Fitting workshops or paying manual teachers.
- (d). Providing art teachers.
- (e). Providing modern language teachers or aiding shorthand instruction.
- (f). Building or rebuilding schools, wholly or partly.

(a) and (b) absorbs about two-thirds of the whole money; while in certain counties just starting this work (f), and to some extent (c) for a few years appear as the principal items.

For instance, the London County Council spent:—

	1893-4	1894-5	1895-6	1896-7
In Maintenance...	£ 7,105	£ 6,340	£ 7,712	£ 9,135
In Equipment.....	5,110	4,030	1,945	4,685
Total.....	12,215	10,370	9,657	13,820

Of the total sum of £13,820 spent in 1896-97, and given to 45 schools, in 16 cases better provision for science teaching was the object of the grant.

Again, Hampshire, which has just started its secondary work, in its last report allocates £3,000 to three schools for building purposes.

I now give five specimen programmes that show the nature of the work in counties in different stages of development:—

#### KENT (97-98).

##### I.—Capital Expenditure (paid or promised) for new Science Buildings and Equipment.

Faversham, Boys .....	£323 paid
„ Girls .....	£390 (£300 paid)
Maidstone, Boys .....	£188 paid
„ Girls .....	£250 „
Rochester, Boys .....	£340 „
„ Girls .....	£170 (£120 paid)
Sandwich .....	£400 (£325 „)
Sevenoaks .....	£300 promised
Yalding .....	£50 „
Canterbury, Boys .....	£80 „

Total ..... £2,491

##### II.—Annual Grants towards salaries of Science Teachers.

£100 a year.	£50 a year.
Borden.	Ashford.
Folkestone.	Canterbury, Boys.
Maidstone, Boys	„ Girls.
„ Girls	Dartford.
Rochester, Boys	Sevenoaks.
„ Girls	Yalding.
	£75 a year.
	Sandwich.

## SURREY (97-98).

SCHOOLS.	Science.	Special.	Short-hand.	Total Surrey Payments.
Dorking, High.....	£ 200	£ —	£ 20	£ 220
Farnham Grammar..	250	160	20	430
Guildford Grammar.	250	—	20	270
Merton Rutlish .....	250	180 (Art)	20	450
Kingston Grammar..	88	12* (Middlesex)	—	88
" Tiffin's Boys'	170	82* (Middlesex)	20	190
" " Girls'	121	29?	—	150
Reigate Grammar ...	250	—	20	270
Richmond County ...	250	180 (Art)	20	450
Wallington County } Girls .....	100	—	—	100
South Wimbledon } Girls .....	100	100	—	200
Total.....				£2,818

\* To be paid by the County Council of Middlesex.

Part services (given to each school) of two travelling modern language teachers=£600.

CONDITIONS.—Time table to be approved; the school to be open to inspection of Council; two to four representatives to be appointed on the governing body by an amended scheme of the Charity Commissioners.

The Technical Education Committee of this Council have spent (since 1892), or are engaged in spending, £22,000 in building grants for secondary schools and schools of science and art, and technical institutes, in the chief towns in the county where none existed before. In addition to the above, a sum of nearly £15,000 has been contributed from local sources to these purposes.

Large additions (laboratories, &c.) have been made to all endowed schools, and Reigate and Farnham schools have been partly rebuilt. The new buildings at Richmond, Wimbledon, Wallington, and Sutton are for use as secondary day schools.

## ESSEX.

School.	GRANT.	
	To provide additional Science Master.	Towards the erection and fitting up of Laboratories or Workshops.
Chelmsford Grammar School...	£ 120	£ —
Earls Colne Grammar School...	75	50
Halstead Grammar School.....	100	—
Sir George Monoux' School, } Walthamstow .....	100	—
Palmer's Endowed School, } Grays .....	100	25
Saffron Walden Grammar School	125	—
Total .....	620	75

The aid given to secondary schools has taken the form of grants towards the cost of additional science masters, and for providing chemical laboratories, fittings and apparatus, as the circumstances of the school required.

The preceding Table shows the schools aided during the year and the general conditions on which the grants are made.

A most interesting printed statement setting out full particulars of all the endowed schools in the county has been prepared, but is too long for publication here.

## DORSET.

School.	Building and Equipment Grants.	Annual Teaching Grants.	Total.
Beaminster Grammer School	£ 250	£ —	£ 250
Foster's School, Sherborne...	200	106	306
Gillingham Grammar School	75	98	173
Shaftesbury Grammar School	75	100	175
Wimborne Grammar School	25	150	175
Total.....	£625	£454	£1,079

## STAFFORDSHIRE (95-96).

The committee make grants on apparatus and fittings to grammar schools, secondary schools, and and other institutions which have not yet received grants directly or indirectly, *e.g.*, through urban authorities or local committees either from the County Council or the Science and Art Department. These grants will be given on the following conditions:—The amount will not exceed 50 per cent. in the case of apparatus and 20 per cent. in the case of fittings on the cost price.

The committee will also give aid in teaching technical subjects, or towards the salary of additional masters to teach these subjects, applications always being considered on their merits. Schools to which such grants are given to be available for the purpose of county examinations without further charge beyond such reasonable expenses as must necessarily be incurred. The following is a list of grants voted to grammar and secondary schools during the year 1895-96:—

	£	s.	d.
Newcastle High School, Teaching ..	125	0	0
Newcastle Orme Girls' School, Teaching ..	20	0	0
" " Apparatus..	5	0	0
Lichfield Grammar School, Apparatus..	2	7	6
Longton Endowed School, Building ..	187	10	0
" " Apparatus..	10	0	0
Rugeley Grammar School, Teaching ..	25	0	0
Stafford Grammar School, Teaching ..	88	0	0
Stone Grammar School, Teaching ..	10	0	0

G

	£	s.	d.
Tamworth Grammar School, Teaching ..	30	0	0
Uttoxeter Grammar School, Teaching ..	100	0	0
„ „ Apparatus..	10	0	0
Total.....	£612	17	6

Travelling teachers are also employed, thus largely increasing the value of the aid.

Upon the vexed question as to how far all this aid has been good for the *Schools*, it is not my province to enter.

We may agree with Mr. Sadler, of the Education Department, on the one side, that "The struggle between letters and science—a false antithesis in many respects—for a long time made (and makes) questions of curriculum needlessly controversial," and that "the study of physical science has profoundly altered our conception of education, and by influencing psychology, has opened the way to a clearer conception, of educational principles," or with Dr. Scott, of the Head Masters' Association, on the other hand that "Schools inadequately endowed, are tempted to sacrifice efficiency in secondary education to the object of obtaining immediate relief under the conditions of 'technical instruction' as interpreted in different localities." But no one can deny that it has been good for the community for science to take its place in every educational sphere, to move in proper surroundings, and to be treated with proper respect. This aid also has enabled it, under the guidance of men like Professor Armstrong, to emerge from the degradation of a mere "subject of instruction," so as to perform the lofty function of a "means of education." Just one word of practical warning. It must be plain that the aid given by means of capitation payments, whether from the Department of Science and Art, or from the County Councils, must tend to drive the students and the needier schools in the direction of a distorted curriculum. Grants, however, of lump sums of money for efficiency, apart from numbers, aid the *whole* of the school, as well as the specific subjects by setting free other school funds for the support of the literary side; this alone is ample justification for the proposals of the recent Departmental Committee on Science and Art grants, that for the future all aid to the schools should come through *one* channel—and that the local one—as it has the power to guarantee fixed sums in advance, and possessing itself the power of the purse to relieve the school of those financial risks, so fatal to the smooth development of the work of the teacher.

Hitherto I have said nothing on the subject of scholarships and exhibitions tenable at or leading from secondary schools, but awarded under the provisions of the Technical Instruction Acts. On this subject I prefer to be brief for two reasons. In the first place, I am a little doubtful as to the actual good done to scientific education, *in all cases*, by these scholarships. Where the local authority has first made the technical instruction in the secondary schools efficient and then sent such scholars and such only as have proved themselves likely to profit by *this kind of education*, great good has resulted. Head masters of the classical type have in this way been taught the needed lesson that science is not the dunces' subject.

Of the 42 authorities awarding scholarships, leading pupils from elementary to secondary schools, seven only make a knowledge of elementary science a *sine qua non* in the examination, while of the 21 requiring drawing a large number allow girls to take needlework instead. Of the 27 authorities giving exhibitions open to pupils from secondary schools and taking them on to universities or university colleges, 14 only insist on a knowledge of science as one of the subjects of examination. Thus, in the area of the great majority of authorities, the subject of science has still failed to take its proper position in scholarship examinations.

Secondly, the whole question has been very fully dealt with in the Record of Technical and Secondary Education of April, 1896.

It is there mentioned, that in the year 1894-5, 70 authorities awarded 11,669 scholarships, or exhibitions of one sort or another, of the total value of £94,512, Derbyshire, Norfolk, Staffordshire, and Yorks (West Riding), having the largest number of scholarships outside London.

For the special purpose of this paper the following two years' comparison has been made:—

*Sums expended by Local Authorities in providing scholarships tenable at secondary schools (including awards and renewals).*

In 1893-4 ..	£19,000	by 30 authorities.
„ 1894-5 ..	£22,000	„ 42 „
	<u>£41,000</u>	

The action of the Joint Scholarship Board in fostering the teaching of elementary practical science in primary schools by means of a minor scholarship syllabus based upon Course



H of the Class subjects of the Day School Code, and in making the elements of mechanics, physics, and chemistry *compulsory*, for literary and commercial as well as for scientific candidates for major scholarships, are likely to have far reaching effects in utilising even scholarships for improving the technical teaching in various classes of schools. Derbyshire, Kent, and Surrey already use these syllabuses. Unfortunately, the want of a central authority to teach these lessons to the various independent examining bodies with vested interests, which regulate scholarship examinations in various parts of the country, has prevented this example spreading as rapidly as we could desire.

In concluding this paper, I wish to gather up the threads of the two lines of progress I have shown as tending towards secondary education organisation, those of the Science and Art Department, and of the Local Authorities, and to show the effect of the action of the latter upon the final product of the development of the former.

Organised science schools, the secondary education branch of the work of the Department of Science and Art, are now rapidly altering their character.

Originally the idea, as was shown earlier, was taken up by School Boards almost entirely. Fired by an ambition to fill an acknowledged void in the lower ranks of secondary schools, the School Boards of large towns entered into an alliance with the Department for the promotion of the higher grade organised science schools.

The old secondary school was still in the clutches of tradition, and despised the work of the Department instead of trying to utilise and reform it.

As a result in 1892 there were 39 organised science day schools in England. Of these, 24 were higher grade elementary, 8 technical, 7 only secondary schools. The elementary influence was in a majority over the other two combined.

Then came the local authorities with their grants, with this result—

In 1897 there are 137 organised science schools in England. Of those 63 are higher grade, 28 technical, and 46 secondary. Thus the *protégés* of the County Councils have when combined a majority of 11 over the representatives of the original type of school, and it is no longer correct to speak of an Organised Science School as if it were essentially the same thing as a Higher Grade School ;

the time appears close at hand when they will be essentially different.

Thus, whether it be in reforming our old grammar schools by giving them opportunities of forming a science side in no way less efficient than those other departments of teaching upon which they have so long prided themselves, or in establishing, for new centres of population, new schools of a type suited to industrial requirements, or in capturing the machinery designed, by Government departments or other authorities, to fit a state of affairs now passing away, the County and Country Borough Councils have, I think I have shown, justified the dictum of one of the principal of those who would wish these things were otherwise, Mr. Addiscott, the President of the National Union of Teachers, when he said this year at Swansea :—

“The educational work of our County Councils was gradually bringing about something resembling the German Real-Schule, and was doing so to such an extent that if a scheme of secondary education were much longer delayed, it would become unnecessary.”

#### SOME SUGGESTIONS FOR THE BETTER ORGANISATION OF EXAMINATIONS—MORE ESPECIALLY IN REFERENCE TO THE QUALIFICATION OF TEACHERS OF TECHNICAL SUBJECTS.

BY W. VIBART DIXON,

Clerk to West Riding Technical Instruction Committee.

##### INTRODUCTORY.

For some time past I have been endeavouring in accordance with the wishes of the Committee for which I act (the West Riding Technical Instruction Committee) to formulate a scheme which might afford a practical solution to some of the difficulties the County Council has met with in reference to the qualifications of teachers, and examinations generally. Therefore, when I received from Sir Henry Wood a request to read a paper, I ventured to hope that it might be considered not inopportune if I availed myself of the present occasion to bring forward the subject.

I must remind the Congress of the circumstances under which the County Councils were called upon in the year 1889 to discharge their new duties under the Technical Instruction Act. There was no central education authority, no system of registration of teachers, no organisation capable of welding together and har-

monising the heterogeneous bodies charged with educational functions, no national system of secondary education; and we still look for help from the Legislature in these matters.

On the other hand, we had in existence a very great variety of schools and classes and other organisations, while new ones were rapidly developed.

Evidently one of the first things demanding consideration was the competency of the various teachers to give that efficient technical instruction which under the provisions of the Act, we had to aid.

We at once turned to see how far we could look for guidance and help to the Government Departments responsible for educational matters and to bodies like the City and Guilds of London Institute, and the Society of Arts, first with a view to ascertaining the qualifications of the teachers, secondly to supplying the necessary training and examinations to supply deficiencies. And now we were confronted by the difficulties caused by the fragmentary and almost haphazard manner in which so much of the educational system of this country has been built up.

Some of these difficulties will be very apparent if the various subjects of technical instruction are grouped in reference to the Government Departments or other bodies by whom the work is aided or directed, with a view to considering what provision is made as to the training and qualifications of the different classes of teachers of technical subjects.

#### GOVERNMENT DEPARTMENTS.

*The Education Department.*—Under the Education Department we have evening continuation schools which to an increasing extent are supplying that preliminary teaching which must be the foundation of more advanced technical instruction.

Here any certificated day school teacher, or any other person approved by the Department, is recognised as qualified. Certain conditions are, however, laid down in the cases of cookery, laundry, and dairy work, but otherwise the regulations of the Department do not in themselves afford any guarantee of the ability of the teacher to give instruction in the technical subject he teaches.

*The Science and Art Department.*—I now come to the science classes and art classes carried on under the regulations of the Science and Art Department, and dependent mainly upon its grants.

A teacher of a science subject must have one of the qualifications mentioned in the Department's regulations, including, among others, a University Degree in Science, a diploma granted by the Department (without regard to any particular science subject) or the Department's first-class certificate in the particular science subject he is to teach. But no guarantee is afforded by such certificate of any general grounding in science, and none of the qualifications recognised by the Department in either science or art necessitate training in teaching methods.

I must now refer to the recent proposals of the Departmental Committee, which reported last month. These proposals will, if carried out, enable the Science and Art Department to examine more critically the qualifications of the teachers. • At the same time, it is evident that a greater degree of responsibility for these matters will be thrown upon County Councils, as education authorities, than as a rule they have hitherto taken upon themselves. And here may I bear testimony to what has been done by those who guide the Department for better adapting their system to meet recent developments.

*Other Government Departments.*—In reference to Government Departments, I may refer to the Statutory examinations affecting particular trades.

Thus, for the purpose of the Home Secretary's certificate, qualifying for the post of manager or under-manager of a coal-mine, Boards for Examinations are established under the Coal Mines Regulation Act, 1887, for the different coal-mining districts, but there is no general standard recognised by the various Boards throughout the country, and no common action, as between the Science and Art Department (in whose classes the miners receive instruction) and the Home-office, as regards either syllabus or examination. Nor has the Technical Instruction Committee any representation on the Examination Boards.

And now, in reference to the registration of plumbers, a thing desirable in itself, we are threatened with yet another Board of Examiners, to be constituted without regard either to the Science and Art Department or county councils, though recourse must be had to the classes aided by these bodies for instruction in the principles of the trade.

Further examples might be given under this head, but I have said enough to show how disjointed is our system in whatever direction we turn.

## CITY AND GUILDS OF LONDON INSTITUTE.

I next come to the classes which are generally described as technological, largely intended for artisans, where principles are taught in their more direct applications to particular trades and occupations.

Such classes are generally conducted under the regulations of the City and Guilds of London Institute, by whom series of examinations are held for students, but not for teachers, except in wood work and metal work.

The regulations of the Institute provide for the registration of persons qualified as follows to be teachers in technology :—

- (a). Any person who has obtained a full technological certificate in the honours grade of the subject to be taught.
- (b). Any person who is engaged in teaching science under the Science and Art Department, and who gives satisfactory evidence of having acquired in the factory or workshop a practical knowledge of the subject to be taught.
- (c). Persons possessing special qualifications, to be considered by the Institute, for teaching technical subjects.

No grants in aid are now given by the City and Guilds of London Institute, and the technological classes, which often require costly appliances, are mainly carried on by means of grants from the county councils.

It is important to bear in mind that a number of the trades and occupations dealt with are local, consequently different places have very distinct needs, both as regards syllabus and examinations.

## SUBJECTS NOT CLASSED ABOVE.

Within the limits of this paper I need only mention further the classes held under the regulations of County Councils outside the sphere of any Government Department or of City and Guilds of London Institute.

These may be grouped as follows :—

Modern languages.

Commercial subjects.

Domestic subjects.

Manual instruction.

Principles of various agricultural subjects and occupations.

## SUNDRY EXAMINING BODIES GRANTING DIPLOMAS OR CERTIFICATES TO TEACHERS OR STUDENTS.

It would be impossible to enter here upon any detailed discussion on the various examin-

ing bodies. It is enough for my present purpose to point out that in a large number of cases the examination, though perhaps suitable for the average student, does not suffice for teachers, that in not a few instances there is no guarantee that the examinations are of an independent character, and lastly that there is nothing to prevent any number of new, and, it may be, wholly irresponsible Bodies from entering the field.

With this multiplicity of examining bodies we find that some of the less popular and more difficult subjects are altogether unprovided for, and in other directions redundancy and overlapping.

## ACTION IN THE WEST RIDING AND IN OTHER COUNTIES.

I must now return to the work of the County Councils.

Undoubtedly there was not at first anything like an adequate supply of qualified teachers, but men and women eagerly presented themselves at the training classes everywhere established, and speedily became furnished with credentials in the shape of diplomas and certificates granted by the numerous bodies I have referred to, some of whom had sprung immediately into existence to meet the new wants. The teachers thus armed requested recognition by the County Councils, who (I now speak for the West Riding) found themselves obliged to enquire into every individual case and to ascertain the value of the diploma or certificate which was presented. Evidently many of the diplomas and certificates could not be regarded as giving any satisfactory assurance of efficiency, and it was frequently necessary to provide supplemental courses in England or abroad for the further training of the teachers.\*

This preliminary stage having been passed through, there sprung up a demand both from the teachers who had qualified, and also from the committees managing the schools, for the establishment of an authoritative list or register of teachers recognised by the County Council.

In response to this demand, and to facilitate its own work, the Technical Instruction Committee determined in the year 1896 to institute a register of teachers of technical subjects,

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\* Since the passing of the Technical Instructions Acts, the West Riding County Council has granted 1,980 exhibitions for the special training of teachers, the total expenditure under this head having been £5,600. The same teacher has frequently held several exhibitions for different subjects.

and to make registration of the teacher a necessary condition of grant.

We now have on the West Riding register 880 teachers. The aggregate number of registration entries is 2,179, and the number of class subjects included is 78. Some of the registrations are provisional and subject to a condition that further training shall be proceeded with, due provision for such training being at the same time made by the County Council.

The register necessarily includes a large number of teachers attached to county borough schools, at which West Riding residents are taught, and which therefore come under the purview of the County Council.

So much for our own experience in the West Riding, now as to others.

Through the courtesy of the secretaries of the technical education committees of a number of counties and county boroughs, I have been furnished with information as to the action of each in reference to the subject I am dealing with. Each County Council has been confronted by the same problems, and each has had to solve them for itself. It follows that there is nothing like uniformity of practice or of standard, and a teacher may find himself recognised as qualified in one county or borough but not in the next.

The difficulty has clearly been much the same, whether, as in the West Riding, the County Council is a supervising body, or, as in some other cases, it is not only a supervising, but also a teaching body.

#### EXAMINATIONS FOR STUDENTS.

I must now refer very briefly to examinations for students, whether teachers or not, on the result of which certificates are granted.

It is found that there is already a widespread demand from students for certificates implying a certain standard of merit as ascertained by examinations, and it is evident that the requirements in this direction will grow. Organised courses for teaching the principles applicable to trades or occupations, extending from five to seven years, have been established in the West Riding, and similar action is being taken elsewhere. Already there are suggestions for the grant of diplomas and degrees in technology.

Meanwhile a number of County Councils have already granted certificates indicating proficiency, and I am informed that these are re-

cognised by the local employers as having a distinct value.\*

This being so, it is the more essential that, in the grant of certificates implying a certain training and capacity, a definite standard should be preserved, and that some credential should be available which should be everywhere accepted. Otherwise there can be no doubt that the multiplicity of certificates and their varying worth must tend not only to confuse, but to destroy the value of the whole.

#### SUGGESTIONS.

I will now pass on to describe the suggestions which I venture to offer.

In the first place, I would propose that the County Councils, acting through their technical instruction committees, should by concerted action do that which they have been endeavouring to do single-handed, and that accordingly they should take steps to form an association for examination purposes; but the scope of the work of such an association might evidently be extended in other directions.

The association should not be itself an examining body, but essentially an organizing and advisory body.

Among its chief objects would be :—

1. To co-ordinate the existing educational machinery in reference to examinations for teachers, and for this purpose to confer with and make representations to government departments and teaching and examining bodies, with a view to ensuring that suitable provision is made for the proper training of teachers, and for the imposition of suitable examinations.
2. If satisfactory provision cannot be made through existing agencies for the above purposes, to organize one or more boards of examiners with a view to supplying deficiencies.
3. To take steps to prevent the undue multiplication of examinations, especially by irresponsible bodies or persons. At the same time to endeavour where necessary

\* The West Riding County Council has this year instituted voluntary examinations of students in its aided classes in shorthand, book-keeping, business methods, French, cookery, and laundry work, and is issuing certificates to those who pass a certain standard. 1,360 students presented themselves, so that it is evident that these examinations to a certain extent meet a distinct want. This step has been taken experimentally, with the intention of taking further action as soon as practicable to secure suitable examinations (not necessarily uniform) by a duly recognised body acting for the entire country or for a number of counties in association.

to consolidate existing bodies so as to secure greater efficiency, and prevent waste of money and other resources.

4. To perform similar duties in reference to schemes of instruction, syllabuses and examinations for students, with a view to the ultimate grant of suitable certificates or diplomas.
5. To consider any proposals from individual County Councils, or groups of County Councils bearing on the above subjects with a view to making suitable provision for a particular locality, whether by the adoption of a local scheme of examinations as part of the authorised scheme of the association, or taking such other steps as the circumstances may require.

#### CONSTITUTION OF ASSOCIATION.

*Central Association.*—Each Technical Instruction Committee to appoint say two representatives on the Central Association, secretaries of the committees being authorised to attend and speak.

With these representatives may be associated representatives of Government Departments and other bodies engaged in education. I need not here attempt to particularise who these should be, but it appears to me desirable that the Education Department, the Science and Art Department (or a central education authority if established by law), the City and Guilds of London Institute, and the Society of Arts should be represented, as also certain of the universities and schools affording technical instruction.

Whether any bodies directly interested in the decisions of the Association should be members, or only attend in a consultative capacity and without vote, would be a matter for consideration.

The Association would naturally have an executive committee, and sub-committees.

*Provincial Associations.*—While advocating a Central Association as being the best means of securing the co-ordination which is necessary in reference to matters of national concern, I by no means propose an undue centralisation of the work.

To prevent any such over-centralisation, and to facilitate organization throughout England, I suggest the formation of Provincial Associations constituted on lines very similar to those proposed for a Central Association; and these Provincial Associations would be federated with the Central Association.

It would be premature to define what should be the area of a province, but taking my own county, it seems to me that we should naturally work with the Yorkshire College and Firth College in such a matter, and we might perhaps take Yorkshire as a province, constituted as follows:—

ADMINISTRATIVE COUNTIES.		COUNTY BOROUGH.		Total of County, including County Boroughs.
Name.	Population. 1891.	Name.	Population. 1891.	
East Riding...	141,516	Hull ... ..	200,044	341,560
North Riding.	284,837	Middlesbro'.	75,532	360,369
West Riding..	1,351,570	Bradford ...	216,361	
		Halifax ...	89,832	
		Huddersfield	95,420	
		Leeds ... ..	367,505	
		Sheffield ...	324,243	2,444,931
		*City of York	—	67,004
Total population ... ..				3,213,864

\* Situate within all three Ancient Ridings.

Each county council would send such number of representatives as might be agreed upon between them.

It may be doubtful whether all our county boroughs would immediately join, though they would hardly hold aloof for long. One county borough has already arranged with us provisionally for a joint inspection of classes and schools.

For some purposes it is probable that two or more Provincial Associations would be linked together; on the other hand there might be sub-committees for individual counties.

The Provincial Association would, where necessary, formulate its own proposals for examinations, and when desirable submit them to the Central Association for its adoption. Any scheme so adopted, though perhaps only local in its practical application, would have the imprimatur of the Central Association.

By means of such Central and Provincial Associations it might be practicable to bring such bodies as the City and Guilds of London Institute and the Society of Arts into much closer touch with the provinces, and thus the local wants might be much better served.

It is with great difficulty that the City and Guilds of London Institute can be induced to alter its syllabuses and schemes, or to approve of organised schemes specially intended to meet local requirements, and I may say the same as to the Society of Arts. Some time since we asked the Society to institute examinations suitable for teachers of commercial subjects. The reply

was that our wants might not be shared by the rest of England, and the request was declined. But we, with our great industrial and commercial population, cannot afford to wait for the rest of England. Hence my anxiety that adequate provision shall be made for the provinces.

#### FINANCES.

The expenditure of such an Association as I have described would be small, and I do not think there need be any serious difficulty as to the financial arrangements; at the same time the subject cannot with advantage be discussed here.

#### GENERAL REMARKS AND CONCLUSION.

1. The plan I have advocated is intended to promote united and consistent action by the education authorities of counties and county boroughs as a whole, at the same time preserving freedom of local action.
2. It would bring County Councils individually and collectively into close touch with Government Departments, and with teaching and examining bodies.
3. No legislation is requisite for its accomplishment.
4. The Associations would be elastic in character, and capable of such amount of recasting as experience and altered circumstances might from time to time require.
5. Should a central education authority be established by legislation on the lines suggested by the recent Royal Commission on Secondary Education, and a statutory body created for the purpose of registration of teachers, the work of the central and provincial associations I am advocating would be somewhat modified, but the need for their continuance as advisory and organising bodies would be quite as great as now, and in some directions even greater, by reason of the field occupied by county education authorities having been enlarged. Meanwhile the work of registration of teachers would have been greatly assisted by their action.

I therefore venture to think that some such scheme as I have endeavoured to outline would be found helpful to the cause of education in this country at the present time.

Sir HENRY TRUEMAN WOOD, with regard to Mr. Dixon's remark that the City and Guilds of London Technical Institute and the Society of Arts were very loth to alter their habits, said he supposed that even the Society of Arts was subject to human infirmity, and perhaps its executive had the natural and official dislike to the trouble which change always involved. But making allowance for that he thought it was not difficult to find reasons for not adopting all suggestions for alteration. Mr. Dixon had remarked that when he asked for an examination of teachers, he received a reply to the effect that probably the requirements of other districts might not coincide with his own. Now, it was not so much that the requirements of different districts might not coincide, but, as a matter of fact, they received innumerable applications from the different districts and different institutions, which were not compatible. For instance, there were two sorts of criticisms which they received regularly after each examination; one was that the standard was so high that it was no use for the candidates to enter for the examinations, and the other was that the standard was so low that the examinations were contemptible, and were of no value at all. He could say the Society of Arts was most anxious to keep its system of examinations up to date, and to modify it as required. During the last few years their examinations, had been constantly modified, and he hoped they would go on being modified. The question of the examination of teachers was a very difficult one. If it was meant to test a teacher's knowledge of a subject, any good examination, so far as an examination could test knowledge, would do that; but if it was intended to test a teacher's capacity for teaching, no examination had ever been invented which would do that. If anyone could devise a good system for the examination of teachers, he was quite sure the Council of the Society of Arts would be only too pleased to adopt it. With regard to the proposals made by Mr. Dixon for general examining bodies, he was quite sure the Society of Arts would be only too glad to hand over the system which it had carried on now for 40 years with success, to any more capable body. Twice in previous years it had offered to abandon its own examinations, and twice from pressure from outside it had resumed them. The Society had spent a considerable amount of money in founding its system of examinations, and if for the last three years or so they had become self-supporting, for the previous 37 years there had been a heavy annual expenditure on them, and he did not think the Society would be at all sorry if it could hand over those examinations in the same way as it handed over the technological examinations. Mr. Dixon also remarked that the West Riding County Council had this year instituted voluntary examinations in shorthand, book-keeping, business methods, French, cookery, and laundry work. In most of those subjects the Society of Arts provided examinations, and he (the speaker) did not quite see the necessity for instituting

additional examinations in the same subjects, unless the standard of the Society was too high, or unless, which was less likely, it was too low.

Mr. HENRY HOBHOUSE, M.P., said he felt sure Mr. Dixon did not desire, any more than anyone else who was acquainted with the multiplicity of examinations, to create an additional examining body. What they wanted was rather to co-ordinate the existing examining bodies, and, as far as possible, to amalgamate them or bring them into harmony. He ventured to think that that could only be done by some such central body as was suggested by the Royal Commission on Education. He did not think any voluntary association or local authority would have sufficient influence or sufficient power with the present examining bodies to make any great changes in that direction. No doubt such a local association as Mr. Dixon proposed might be of very great use, but he looked forward to the organisation of a central authority as a necessity before we could get our examinations better co-ordinated and placed on a better footing. With regard to the interesting paper which had been read by Mr. Macan, he thought all present must have been impressed with the amount, the valuable character, and the great variety of the work that had been done by our County Councils in technical instruction during the last few years. But he hoped it would not induce any member of the Congress to go away with the impression that so much had been done, and so much was being done, that little more was needed in the field of legislative action. Speaking as a practical worker in one of the counties of England in technical instruction, he felt convinced that three things were needed before the work of the County Councils on technical instruction could be placed on a satisfactory basis. First and foremost, these funds must be permanently appropriated to education. No doubt in certain counties, possibly in Surrey, in the West Riding, and other counties, where there was a vast enthusiasm for educational work of all kinds, it might not be considered necessary to make a change in the law in this respect. But there were counties in England, he was sorry to say, where that enthusiasm did not exist, where there was sometimes a tendency, a passing tendency, under the influence, say, of agricultural depression, to devote these funds to other purposes than education. Local administrators, who were naturally, like other representatives, subject to a certain amount of pressure from their constituents, felt, in such times, difficulties in the way of carrying on the regular and uninterrupted educational work to which these funds ought to be devoted. Before many months were over the Legislature ought definitely, and once for all, to devote these funds to the purposes of education. Secondly, the sphere of their work under the Technical Instruction Act ought to be extended. As Mr. Macan had shown by his figures, different County Councils took different views of what their duties were. Some

devoted large sums to secondary schools, others expended little or nothing on secondary schools; many devoted large sums to improving evening continuation schools, which, in the eyes of others, was the work of the Education Department. When the money was secured to educational purposes they needed to know more clearly than they did at present what those purposes were to be. And, thirdly, in order to carry out technical instruction work in connection with secondary schools, the local authority, properly constituted, ought to be able to exercise some general supervision over all local secondary schools. Nothing could be more unsatisfactory than having to deal with one department of a school, and having nothing to do with another—having complete jurisdiction over science and art subjects, and nothing to say upon literary subjects. No school could be carried on satisfactorily under those circumstances, except by accident. The Legislature ought to give to the local authority the reorganisation of secondary education, and it ought also to give them some general jurisdiction in the interests of science and art subjects.

Mr. T. TURNER (Stafford), referring to the remarks made by Sir Henry Trueman Wood on Mr. Dixon's paper, said there must naturally be considerable difficulty in altering the syllabus for an examination, when a department or a society was dealing with the whole country. But where a comparatively small number of students had to be dealt with, his experience had shown that the Department and the City and Guilds of London Institute were ready to alter their syllabus in order to meet local requirements. Referring to Mr. Macan's paper, he said Mr. Macan had given them a very interesting account of the work of the County Council, particularly in connection with secondary education. Mr. Macan referred to an important point when he said the Technical Instruction Act made no class distinctions. He (the speaker) had certainly found the better working-classes and the lower middle-classes were the most suitable portion of the community for the purpose of technical instruction. Well-to-do people could take care of themselves, and the very poor did not really appreciate the education that was being offered to them. The education given should be sufficiently good for the middle-class and sufficiently cheap for the poor. He was always pleased to see the middle-classes attend all forms of instruction, as it helped to set the fashion. The poor man was apt to say, if it was not good enough for the well-to-do, it was not good enough for him. His experience was that they could not start country classes with the poor people; but if the first year some of the better class people of the village would attend, the next year the poor people would come too.

Professor SILVANUS THOMPSON said the statement made by Mr. Dixon that the City and Guilds of London Institute examinations were difficult to modify caught his ear, because he happened to have the honour of sitting on the Examination Board of

the City and Guilds Institute which had the appointment of examiners, and so far as his memory went, for the last three or four years there had been no meeting of that Board at which they had not made some alteration in some syllabus. They received a good many complaints, and some teachers complained that they were continually changing their syllabus from year to year. One thing they had particularly tried to do: where, as for example in the textile industry, there was a good deal of difference between the technical terms used in different parts of the country, they had taken precautions to have more than one examiner, and not to choose both examiners from one district. Referring to Mr. Macan's paper, he said he had himself in past years criticised the operations of the Science and Art Department. He had criticised their regulations about qualifications of teachers and so forth, and he was quite certain that very great progress had been made by the Science and Art Department, not only within the last year or two, but for the last seven or eight years. The Science and Art Department, though a Government Department, was after all human, and amenable to criticism. If we were not so anxious about offending the Department, and if we were more free and frank in our criticisms, we might get a good deal more than we had got in the past from that august body. The reforms and modifications that had taken place in the programme of the work of the Science and Art Department coincided with the administration of Captain Abney. He (the speaker) believed we had in him an exceedingly good and intelligent friend to the technical education movement, and many of the reforms that had been carried out were due to his perception that the time had come for change. Returning to Mr. Dixon's paper, he cordially emphasized the danger of multiplying examinations. Anything that could be done toward co-ordinating the work so as to simplify the machinery and the number of bodies that were attempting to examine, and that would at the same time give us a really workable scheme of examinations, and as little of them as possible in secondary and technical education, would be helping on a good work. We must not allow new bodies to duplicate what was already being done by old ones. The evil of certificate hunting, which was now deplorably prevalent, would become more prevalent if we had competing bodies giving certificates for the same thing.

Mr. THOMAS COPE (Leicestershire) said Mr. Macan in his able paper had made some remarks with regard to education generally, and particularly pointed them with regard to what he called the education of the "captains of industry." He did not know whether Mr. Macan meant that we ought to be able to teach our chemists in England, and not have to send them to Germany to be educated. If that was what he meant, County Councils were too small to take up any such work as that. When they came to teaching the captains of industry, that was to say, giving the very highest possible education in highly specialised

subjects, he thought they would find very great difficulty in entrusting that work merely to County Councils and local bodies, because they had neither sufficient money nor sufficient pupils to properly do the work. In the district with which he was connected they had found it necessary and advisable to combine four counties in order to teach the one special subject of dairy industry. With chemistry and electricity, and such subjects, he thought the difficulty would be greater still, and if they wished to give the education in England there would have to be a gathering together of all the County Councils, and other municipal bodies at one great centre, or else the work ought to be undertaken by the State.

The CHAIRMAN said he wished to re-echo the words of the last speaker; the whole organisation of this technical education ought to come from the State. One thing that was absolutely necessary was that there should be a sufficient number of capable teachers. Unless the education of the teachers was thoroughly sound the instruction which they gave to others would always be unsatisfactory.

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## THE LIMITATIONS OF THE WORK OF COUNTY COUNCILS.

By THOMAS TURNER, A.R.S.M., F.I.C.

(Director of Technical Instruction to the Staffordshire County Council.)

As the work done by County Councils has been one of the most striking developments in the progress of technical instruction in England during the past seven years, an outline of the conditions under which this work has been conducted may not be without interest to the visitors to this Conference, even though much of what may be said may be an old story to those who are themselves connected with county technical instruction committees. The limitations under which this work is conducted may be conveniently considered under three heads.—(1) The legal conditions under which technical instruction may be supplied; (2) limitations arising from the area and income of county authorities; and (3) the condition and previous education of the pupils taught.

I. The first Technical Instruction Act, which was passed in 1889, has been extended by an Act passed in 1891, while additional facilities for the acquisition of land were afforded by a further Act passed in 1892. The fundamental conditions of the Act of 1889, however, remain unaltered, and, speaking generally, have been found to work satisfactorily. The most important provisions of the Act of 1889 are the following:—



(a). That the local authority shall not supply or aid the supply of instruction to scholars receiving instruction in the obligatory subjects at an elementary school.

(b). That a pupil shall not be required to attend at, or abstain from attending at, any place of religious worship, or any religious service.

(c). That aid shall not be given to any school conducted for private profit.

(d). Technical instruction shall not include teaching the practice of any trade, industry, or employment.

As the above are the chief limitations contained in the Act of 1889, which confers definite powers upon local authorities, it will be seen that these authorities are allowed great freedom in their choice of subjects, methods of instruction, and general procedure, and are practically independent so long as their expenditure, as certified by the Local Government Board auditor, comes within the above and certain other minor conditions. Though no provision is made in the Act for the teaching of literary subjects, aid may be given to the technical side of a school which also teaches literature or languages, so that indirectly considerable assistance can be given to the study of literary subjects. The whole field of education beyond the elementary school is thus open to the County Council, so long as aid is not given to institutions with a definite religious bias, or to those conducted for private profit, nor must the practice of a trade or profession be taught. The last regulation has led to many interesting questions being raised as to exactly where the teaching of a trade begins, and the teaching of the principles underlying that trade ends, and while it is universally recognised that the professional training of a solicitor or a medical man is outside the Technical Instruction Act, it has only recently been decided that the training of nurses is illegal, while the teaching of plumbing, or of hedging, ditching, thatching, and other manual processes of agriculture, is regarded as coming within the Act. Generally speaking, the regulations in reference to schools conducted for private profit, or those without a conscience clause, have worked well and given satisfaction, but it must be acknowledged that a number of cases of hardship have occurred with schools on the borderland, since the best of the private schools are incomparably better than many of the smaller endowed schools, and some of the high schools attached to particular religious denominations have done a public work for which no recognition is pro-

vided under the Act. Still, as before stated, the limitations have, on the whole, worked well, and any proposals to give relief in special cases of hardship would need to be considered with the greatest possible care. One of the advantages of the Act of 1889, is the elasticity of the provisions under which local authorities work, and County Councils have not been slow to avail themselves of the reasonable freedom thus conferred.

II. Passing next to the limitations arising from the area and income of county authorities, it must be remembered that generally speaking the County Council or County Borough Council is not a large unit, as there are in England, excluding the county of Monmouth, 49 county councils and 61 County Boroughs, or a total of 110 county authorities. Apart from London, which may be regarded as altogether exceptional, the average population in each area would not much exceed a quarter of a million, while in some few cases it is little over 50,000. Owing chiefly to this smallness of the unit, county authorities have done comparatively little in the direction of university teaching, or the founding of university colleges, while for other teaching of the highest class it has not unfrequently been found advantageous for two or more counties to combine together. It is doubtful whether, under present conditions, a university college could be successfully conducted with a population of much less than half a million. There are, however, only nine counties with a population of 500,000 or upwards. Of these, Durham, Staffordshire, West Riding of Yorkshire, Lancashire, Kent, and Surrey, were already provided with university colleges either in their own areas or on their immediate borders; while Cheshire and Essex, though not quite so conveniently placed, were still not far from facilities for higher instruction. The remaining county, Devonshire, was thus the only one among the most populous counties which was not within reasonable access of higher teaching at the passing of the Technical Instruction Act. It is not, therefore, surprising that County Councils have done little in the direction of establishing colleges of university rank. Considerable sums of money have, however, been spent in the provision of higher instruction as applied to agriculture, horticulture, and dairying, and the College at Wye, the Midland Dairy Institute, the Holmes Chapel School, and the Extension College, at Reading, will serve as examples of many similar institutions which have come into

existence during the last few years, chiefly owing to the work of County Councils. The needs of Devonshire have also to some extent been met by the provision of a University Extension College at Exeter.

For reasons somewhat similar to those above given county boroughs also have not expended much of their income on work of a university type, and University College, Nottingham, is probably a unique example of an institution of the kind founded and supported by the local authority. The function of the County Council or County Borough Council has thus been chiefly that of taking the pupils who have left the elementary school and supplying or aiding the supply of almost all forms of education between the elementary school and the university college. Large sums of money have been spent in providing technical schools, at which instruction of the highest obtainable type has been given in relation to local industries, while scholarships have been provided to enable suitable persons to proceed to a university course. The special characteristic of the work of County Councils has thus been the local supply of further instruction to persons who have already left the elementary school.

The funds available for the purposes of technical instruction consist of the residue under the Local Taxation (Customs and Excise) Act, amounting in the aggregate to about £750,000 per annum, and contributions from the local rates, which may not exceed 1d. in the £ on the rateable value. Speaking generally the local rate is never raised in rural districts, but in urban districts, each year an increasing amount is so provided, and in Staffordshire alone, during 1896, twenty-six urban authorities contributed money from the rates or other local sources, to meet corresponding grants of the County Council.

In many cases the Exchequer contribution is the only source of income of the technical instruction committee, and is found to be sufficient for present purposes. In others, the Exchequer contribution is supplemented by the full penny rate, and is then found to be insufficient. This is largely due to the basis of distribution, as a result of which some counties or county boroughs, receive less than 3½d. per unit of population per annum, while others receive three times as much per head in the same time. It is only necessary to compare, on the one hand, busy manufacturing towns, like Hanley or West Bromwich, with a population of 60,000, and a grant of 3½d. per head, with Bath, having a population of 52,000 and 6¼d.

per head, or Oxford with a population of 46,000 and 7¾d. per head, on the other hand, to see how the industrial centres, which are the basis of our commercial supremacy, suffer by the present method of distribution. The system presses most hardly upon industrial counties and small county boroughs, which, in view of their manufacturing industries, are more in need of technical instruction than any other part of the country. State aid to elementary schools and to Science and Art Department classes is distributed according to the number of pupils taught and the needs of particular districts; and the aid given for technical instruction should be distributed according to some similar rational system. The present method of distribution can lay claim to no equitable or scientific basis, and imposes a most serious limitation on the work of many deserving authorities.

III. Dealing lastly with the limitations due to the conditions affecting the pupils to be taught, it must be remembered that the majority of those who have attended County Council classes hitherto have been persons who have left the elementary school, and who are engaged during the day in some trade or occupation at which they earn their livelihood. It is therefore essential that the education should be provided locally, and in the country districts particularly, no educational facilities are of much use for this class of student if the distance to be travelled is more than about three miles. Further, as the majority of the pupils left the elementary school at an early age, and have forgotten the greater part of the little they once knew, much of the instruction is necessarily of a very elementary character, and the fees charged are merely nominal. Training of a really high type can thus only be provided at large centres of population, or at such institutions as farm or dairy schools, at which the pupils are resident for a considerable period.

The state of things which has hitherto existed must, however, not be regarded as permanent, as the class of pupils which at first flocked to County Council classes will gradually be supplied, and in future it will be possible to raise the standard of local instruction, owing partly to longer attendance at the elementary school, and also to the excellent work done in evening continuation schools, particularly in rural districts.

But after all it must be remembered that the training to be obtained by a young man or woman who attends evening classes, say twice a week, and who is engaged in other occupa-

tions during the day, must necessarily be imperfect and superficial. The industrial leaders of the next generation will be largely drawn from those who have been able during their most receptive and retentive years to pursue a systematic course of study. It is for this reason that the question of secondary education occupies so important a position in the public mind at present, and is so closely connected with the proper conduct of every form of technical instruction. It is only by careful training in efficient secondary schools, up to the age of sixteen at least, that pupils can be prepared to take full advantage of the higher forms of technical instruction which are being provided in ever increasing number. County Councils have done much to assist secondary schools by the provision of scholarships, the supply of apparatus, payment of competent teachers, building grants for laboratories and class-rooms, and other similar means. But the powers of local authorities are at present altogether inadequate, and wide districts are unsupplied with efficient secondary schools. For example, in the part of Staffordshire, north of a line drawn from Uttoxeter to Newcastle, there is included an area of upwards of 300 square miles in which are two large denominational boys' boarding schools, but no public boys' secondary school recognised by the County Council as efficient, and only one public secondary school for girls, which was founded by private enterprise, and has only recently been in a position to receive aid from the County Council. Bad as is the condition of secondary education for boys, it is generally even worse for girls, for, starting in another direction from Burton on the extreme east of the county, and passing right through the county to Newport, a distance of upwards of 30 miles, there is not a single secondary school for girls, at which County Council scholarships could legally be held. Nor is there a girls' secondary school between Newcastle in the north and Walsall in the south, again a distance of about 30 miles. So that in an area approaching 900 square miles, though there are five efficient elementary schools for boys, there is no public secondary school for girls. Probably Staffordshire is not worse off in respect to secondary education than many other counties, but what has been said will serve to indicate the grave limitation which is laid upon county technical instruction committees by the present chaotic state of secondary education. All who are interested in the subject are looking forward most anxiously to the proposals of the Govern-

ment, and hope that at an early date increased powers, which are now so urgently needed, may be granted by Parliament. It is only by such means that a properly-trained body of students can be prepared to take full advantage of the facilities for education now provided by so large an expenditure of public money, and until a good foundation can be secured much of the superstructure must remain in an unsupported or insecure condition.

## THE TRUE BASIS OF TECHNICAL EDUCATION.

BY W. SLINGO,

Principal Telegraphists' School of Science.

The author of this paper first turned his attention to the question of technical education about 23 years ago, and it is hoped, therefore, that this Congress will accept the few remarks which are now addressed to it as expressing the opinions of one who is largely interested in the question, and also as one who has had ample experience upon which to base such opinions.

The author is anxious that the managers of our technical schools and colleges should have some clear and definite course of action laid down for their guidance. At present the state of affairs is, as will be demonstrated in this paper, little short of chaos.

Initially, the real and ultimate aim of true technical education should be set forth. The air just now is full of wild ideas about the general elevation of mankind, the approach of a sort of intellectual millennium, the appropriation of the commerce of the world, and numberless other topics of a similar character, but all of which are being paraded by so-called educationalists as coming within the scope of technical education. The proper test of technical education should be its commercial value, but there is considerable danger of that value being greatly over-estimated. Attention is naturally directed to Germany, where such education has attained its, at present, highest development, and the prominent position which Germans have in recent years acquired in the commercial world has caused many to assume that that position is due entirely to the system of education. The equalizing effects of the telegraph, of railways, and generally of increased facilities for transport and correspondence are of course ignored. It is however more than questionable whether, if the German system of education had been applied in any other continental country,

similar commercial progress would have resulted. The main causes of Germany's progress are to be found in the general industry of her sons, in the determination with which they pursue their objects, in the low rate of wages for which her workmen are content to labour, in the low profits which the masters are content to receive, in the general sense of discipline inspired by her military system, in the greater relative power of capital as compared with labour, in the influence of a fostering government, in their general business capabilities, and last, but not least, in the way in which they utilise their technically-trained men.

In this country a vast amount of money is spent annually on what is termed technical education, and yet so injudiciously is this money spent, that there are not wanting competent judges who insist that we should be better off without the results obtained thereby.

From the author's point of view, the first great aim of technical education should be to fit the student for a particular industry, and to give him such weapons as will enable him to prosper in that industry. The result of such education should be that he could perform his own particular work in a superior manner, in a shorter time, and with less expenditure of energy, than he could in the absence of such education.

The necessity for the general adoption of some system of technical education has become more and more evident as the ancient system of apprenticeship has gradually died out. This ancient system of apprenticeship was one admirably adapted to the conditions of life, and to the requirements of the time. The apprentice lived with his master, learned the manual portion of his trade in the shop, and received from his master such instruction as he could or was disposed to give in the arts and mysteries (*i.e.*, science) of the particular industry. The instruction was oral, nothing was committed to paper, and the secrets of the trade were handed down from generation to generation. This system tended to limit the number of entrants into any one trade, and thereby to prevent the overcrowding of any particular labour market. On the other hand, development was hampered by the system; the methods of one establishment did not become known at another; the apprentice had to assume a very humble and often menial position; his life was frequently very hard, the feeding often inadequate, and the flogging none too rare. Nevertheless, a highly-skilled master had at

all times many candidates for apprenticeship from whom he, as a matter of course, selected the most promising. Taking all the circumstances into consideration, it is scarcely to be wondered at that the system produced a greater proportion of first-class workmen than exists at the present time. One weak point consisted in the comparative narrowness of the education received, consequent upon the fact that the apprentice had no source of information other than his master or his master's shop.

At the present time it is too often the practice for a lad to enter some firm or establishment as a sort of odd boy; if he picks up sufficient knowledge of the business and does what he can to become proficient in the work, he in time blossoms out as an artisan, but if he neglects such opportunities as may fall in his way he remains a labourer to the end of his days. No attempt is made by the master to educate his boys, and the natural result is a lowering of the standard of skilled labour and the flooding of our markets with shoddy work. In such circumstances, it is not to be wondered at that the public appreciation of good work has been degraded, and the consequence is that the price which has to be paid for good work is very often regarded as sheer extravagance.

It is to the remedying of this defect, to the recovery of the lost ground, that the attention of our educationalists should be directed, but the trouble is that there are generally three parties to be educated, *viz.*, the artisan to turn out good work, the master to see that it is to his interest and credit to pay for good work, and the public, *i.e.*, the purchaser, to recognise that it is to his advantage to have only good work even though the cost be a little higher, for after all the difference between the cost of good work and shoddy is, in the great majority of cases, only a small percentage of the total outlay involved.

It is the purpose in this paper to deal mainly with the workman; let us call him the apprentice although he be little more than a boy doing odd jobs, and picking up such information as may fall in his way; or we may suppose him to be a young fellow who has just been raised to the dignity of a mechanic or an artisan. Whatever for the moment his exact position may be, he is in one respect in very much the same position as the apprentice of old. He has picked out for himself, or circumstances have placed him in, a particular trade, and he desires to prosper in that trade. He can only pick up the crumbs of knowledge and experience as

they fall from the hands or lips of his older comrades, but the great fact remains that *he is in a trade*, he has a trade to follow, and he is anxious to learn all he can about that trade. We are not concerned with that type of youth whose only desire is to do as little as he can in return for his wages, and to ignore altogether the interests of his employer. Such a youth is soon recognised. But to return to the cardinal point. The lad has adopted a trade—the practical lessons he receives, and which correspond to that part of the education of the old-time apprentice which was gained in his master's workshop, are the aforesaid crumbs which he picks up. Where is he to get the counterpart of the explanation of the arts and mysteries as imparted by the master of old time? Clearly this is the breach where our polytechnics and technical schools should step in, and they do step in, but only with one toe of one foot. The rest is left outside; the breach is not filled; the solitary toe soon gets trodden on and is withdrawn, and our poor apprentice is once more without an instructor. To make this important point clear is to demonstrate the inutility of much that is now being done in the name of technical education. Let us suppose that our apprentice has the incentive to avail himself of the facilities afforded by our polytechnics and technical schools. When he has selected his "institution" he attends for the first time with confidence, but he speedily finds that the men who should be prepared and able to teach him how to become more skilful at his work, might, with advantage, take a few lessons from him. Frequently his would-be teachers are young men fresh from some other technical institution, and the workman discovers that they are merely prepared to coach him up for an examination or two, thus enabling him to obtain certificates but not skill. The examination papers are in too many cases set by some professor guileless of any real practical knowledge and absolutely incapable of coming down to the level of the workman. As both the professor and his assistants who prepare the examination papers for him base their work upon the same books as those from which the teachers derive their information, there can be no doubt that such teachers are or should be well qualified to cram the student so that he can obtain his certificates. Indeed a genuine and really capable teacher dare not waste much time in imparting really useful information to his students, because in a technical institution, the efficiency of a teacher is

generally judged by the number of certificates gained by his pupils, and knowledge which is useful to a man in his work is not as a rule worth anything in an examination. In the course of a week or two, then, our apprentice sees through this, and grasps the fact that he can derive very little benefit from a course of lectures arranged to be acceptable to, and comprehended by, the majority of the students (mostly amateurs), and he loses at once any confidence he might have had in the lecturer when the latter essays to describe the fundamental principles of the underlying science in a language unknown to him, when the lecturer proves himself utterly ignorant of workshop practice and language, and when, as generally happens, he describes as current practice methods which have long since been abandoned. The immediate consequence is that our apprentice, for whom, or such as whom, the class ought primarily to be conducted, will if he be a simple minded man desert the class by the end of the first month or so, and will do his best to dissuade his fellow-workmen from making a similar attempt.

It might be imagined that such abortive efforts on the part of our apprentice would if frequently repeated have the effect of entirely depriving technical institutions of pupils, but unfortunately the very imperfections of the system enable it to survive. The exclusion of the artisan who cannot write neatly and is unable readily to give evidence of his knowledge in an examination paper, is not felt as a serious loss either by the teacher or by the institution. On the other hand, it is a distinct gain, because the field is now open to another class of students, many of whom would hesitate to mix too freely with the average artisan; a class consisting largely of youths who have recently been turned out as finished by the Board schools; of school teachers anxious to obtain certificates, no matter what the subject may be, providing that those certificates can be obtained with the minimum amount of work; of clerks in offices and factories; and of shopkeepers' assistants, with a sprinkling of unskilled labourers and a few craftsmen in other trades anxious to provide a second string to their bow. To such a class of amateurs the teacher, no matter how good or how earnest he may be, must now adapt his lectures, and in the event of a student like our apprentice remaining in the class, he must be content to listen to a vast amount of talk meaningless to him, and often bristling with inaccuracies. For the

existing system of examination such pupils are exactly those required by the teacher to obtain good results, and he is assisted rather than otherwise by the distressing fact that few, if any, of his pupils ever have had, or ever will have, either the opportunity or the inclination, to test his precepts by practice.

It may, perhaps, be asserted that this doleful picture is altogether overdrawn, but the recital of a few simple facts will suffice as a refutation. One city clerk was in his year the prize carpenter in the United Kingdom, another took the prize in electric lighting, another the prize in electrical instrument making, another in tools, and another who had never been out of London for more than a week or two at a time obtained a certificate qualifying him as a teacher of agriculture. A schoolmaster became a prize electrical engineer, and an ironmonger's clerk a prize electrical instrument maker. Another teacher who had in all probability never seen the inside of a telegraph station blossomed forth as the first prizeman in telegraphy and was inferentially the best trained telegraphist in the Kingdom.

Now the principle of examinations is not to be blamed for these results; the fault lies entirely with the examiners who too often base their examination papers solely on certain text books, ignoring altogether the thousand and one points of detail and application which never get into text books at all. The author has in mind one paper in an electrical technical subject in which twelve of the fifteen questions were based entirely on theoretical electricity, and could be answered by anyone who had gone through a moderate course of instruction in electricity, but who had never had any *practical* connection with the subject.

Again, the comparatively illiterate student often fails because of his inability to grasp the meaning of the question. Many a student was floored by a question in a recent paper in elementary electricity, which opened as follows:—"An insulated wire is wrapped for a few turns in a right-handed coil round the core of a ring of soft iron, and then for a few turns in a left-handed coil round the core." *The core of a ring of soft iron* is meaningless, and the examiner probably meant, "A core of soft iron in the form of a ring." In another paper the candidate was asked to "describe and sketch an electric bell, which continues to ring as long as the circuit is closed." There is no such bell. Assuming the ordinary trembler-

the one referred to, the latter part of

the question should have read, "as long as the button or other contact-maker is pressed."

Examples such as these could be mentioned by the dozen.

These examinations usually last for three hours, but it is no unusual thing to find that one of the eight or ten questions to be answered involves as much work as would occupy a thoroughly experienced engineer for several weeks. Can we wonder that the candidate is sometimes driven to the conclusion that the examiner is himself in search of information?

Sufficient has been said to demonstrate some of the weak points in the examinations, but the inequity of the present system of technical education may be further illustrated in the following way:—A friend of the author, who is in well-to-do circumstances, has a number of grown-up daughters. A technical school is opened in the neighbourhood; dressmaking is one of the subjects of instruction; our friend's daughters clamour to join. What is the consequence? The poor dressmaker, who contributes to the rates, assists thereby in teaching her own customers to take the bread out of her mouth. Now, those young ladies were quite within their rights in learning to make their own garments, and they were prepared to pay any reasonable fee for their instruction, but instead of a system being introduced which would allow them to do so, they have to pursue their hobby at the ratepayers' expense, the business of the poor ratepaying dressmaker is reduced, and practically the requirements of the poorer students have to be neglected by the teacher in order that the desires of what may be called the irregular pupils may be satisfied.

While discussing the matter recently with a sanitary inspector who had undertaken to instruct a class in his special branch of labour, the author asked him, why he wasted his time on so many outsiders or amateurs, and the answer was that, when he had engaged to take the class he did not know that any and every applicant would be admitted to it, and that when he protested he was met with the argument that as every ratepayer contributed towards the erection and maintenance of the institution, every ratepayer had the full right to avail himself of every opportunity of benefiting by any and every form of instruction which the institution was prepared to give. It is contended that no stretch of language can legitimately construe such an argument as being in accordance with the true principles of technical education.

There is another source of trouble and waste

in our present system which may be called the overlapping or duplicating of classes. Owing to the present want of cohesion between the various schools, each school is worked as a separate entity and each school opens classes in as many subjects as it can find even a few pupils to attend, oblivious of the actual requirement of the vicinity, and of the work which is being done by neighbouring institutions. This is particularly the case in London. To take only one subject, that of electrical engineering; there is already more than sufficient machinery in the many London schools to provide for the requirements of the whole industry throughout the entire kingdom.

Enough it is thought has been said to show that in-so-far as what is herein considered to be the true objective of technical education is concerned, by far the larger portion of the money which is being spent upon so called technical classes, is absolutely wasted and often with pernicious results. But the leaks do not end here, for in many cases, cases which frequently come under our notice, the lecture rooms and laboratories are provided with quantities of costly apparatus which neither the teacher nor the student knows how to handle, and which is therefore damaged and ultimately destroyed by being kicked along the floor, or allowed to lie about until it falls to pieces.

What is the remedy for all this waste and mischief?

In the first place, the examiners should improve their papers, and make them such that only students practically acquainted with the various industries could answer them. Certificates should be withheld unless such a practical acquaintance can be proved. The questions should be framed in simple, accurate, and unmistakable phraseology.

Secondly, schools should be grouped together, each to specialize in one or two branches of industry, according to the requirements of the locality.

Thirdly, the teachers should be men actually engaged in responsible positions in the several industries.

Fourthly, the instruction should be arranged exclusively for men engaged in the several industries. Amateurs or outsiders should only be admitted on payment of a decidedly remunerative fee. Every *bonâ fide* student should be required to take courses of instruction in the science subjects allied to his particular technical subject. Let the fee for these students be an inclusive one to cover the allied subjects.

Fifthly, there should be an annual inspection and stock-taking of apparatus and materials, as a check, not against the actual stock, but in reality against the use which has been made of it.

It is believed that if a scheme similar to that which is now suggested were carried out, the various institutions would in a short time draw the right class of students, and in sufficient numbers to meet all requirements. The theoretical classes might be thrown open with certain restrictions to all comers. In this way the good that our technical institutions might accomplish is incalculable. The author would like to demonstrate this by showing what is being done in and by the school which he founded 21 years ago. None but telegraphists are admitted; nothing is taught but what is likely to be of service in the practice of telegraphy; every student is encouraged to take, in time, every class in the time-table. In the superior or third year classes, no student is allowed to enter unless he has attended successfully all the classes prescribed for first and second year students. We started with five students and now number 350. All the instructors were trained in the school, all were telegraphists and are still actively employed in the service, and all are medallists. The Postal Telegraph authorities are convinced that a technically trained telegraphist is more valuable than a simple manipulative telegraphist, because he is able to detect faults, and regulate his apparatus as required by the varying conditions of the lines, and the fluctuations of the traffic. And by a recently-issued order of the Postmaster-General, every telegraphist of 24 years of age and upwards, who is not already receiving his maximum scale of pay, and who can produce a certificate from the Science and Art Department and the City and Guilds Institute in Electricity and Telegraphy respectively, has £6 added to his salary every year until he attains his maximum. Last year no less than 19 of the students obtained superior appointments on account of their technical training, and such are a few of the results of technical education carried out on lines which this international Congress is asked to endorse as the correct and only true basis of technical education.

Mr. C. T. MILLIS thought the writer of the last paper did not intend to do injustice to any branch of the technical work which was being done in London, but as the paper had a general title—"The True Basis of Technical Education"—he felt, as one responsible for the education work of a polytechnic, he must call attention to one or two remarks made in

connection with the attendance of apprentices at polytechnic institutions. He thought the writer of the paper really intended to refer more particularly to the teaching of electrical subjects, rather than to ordinary trade subjects, such as carpentry and plumbing. He would find that the majority of those attending the trade classes at the polytechnics were actually engaged in the industry for which the class was formed. The teachers of those classes were also themselves, in the majority of cases, actively engaged in the trade which they were engaged to teach, and they also had a knowledge of certain scientific principles which were cognate to the industry which they were teaching. He thought that none of the difficulties, and none of the mistakes mentioned in the paper, were made as regarded the technical education of workmen generally. They might possibly arise in electrical engineering, from the fact that students might attend classes in electricity and magnetism, those classes being open to all students, and then some might pass on to what might be called purely technical classes. He thought the reader of the paper had unwittingly done injustice to the London polytechnics. Mr. Wells had spoken on the difficulties which most principals of polytechnics experienced in procuring good teachers for the teaching of what might be called "trained classes," classes in such subjects as masonry, carpentry, plumbing, metal working, and engineering. He (the speaker) could quite understand that there might not be the same difficulty in finding teachers able to teach such subjects as electrical engineering. They were a more highly educated class of men, men who had received a certain amount of scientific training, and it might be easier to find teachers for those subjects.

Mr. A. E. BRISCOE said he should like to say a word about the last paper, especially as he had charge of the electrical department at Battersea. He thought Mr. Slingo had been rather unfair to the teaching carried on in the modern technical schools. They had to recognise the fact that they had two entirely distinct types of students to deal with; the artisan who was going to be an artisan merely, the man who would make a good skilled workman in his own branch, but who was never likely to do anything else; and there was also the man who had charge of jobs and who would rise to a more responsible position. Besides these two types, he had in some of his own classes men who wanted to get a knowledge of electrical engineering work in connection with their own trades; for instance, he had in a class at Battersea no less than three men who were fire insurance inspectors, and they joined the classes in order to get some knowledge of electrical work, especially some knowledge of what was to be avoided and what commended in the matter of wires. These different classes required entirely distinct types of instruction. The best thing to do for the artisan was to teach him his craft as well as we could. Give him a chance of doing things that otherwise he would not

be able to do; give him a chance, too, of handling instruments, and seeing the inside of them, and of getting acquainted with them. Then, men in more responsible positions required a better training. They must be encouraged to take up work outside their own work, and given the greatest variety of work to do. In that direction they hoped to do a great deal in the future. They hoped to get the boys who attended the technical day-schools to go on to technical work, and so be able to take up responsible positions. If they could in this way train up a body of men capable of doing the very best work they would not have existed in vain. He did not hold a brief for Mr. Wells, but he thought the point Mr. Wells was trying to emphasise was this—that you might find a man easily enough who knew his work thoroughly, but it was very difficult to find the workman who both knew his work thoroughly, and also possessed sufficient general knowledge to enable him to make a successful teacher. It might not, perhaps, be so difficult to find such a man in electrical engineering, because they were better trained than the average run of men.

Mr. CHARLES WILLIAMS (Northumberland) said he should not have troubled the Congress had not Mr. Slingo asked them to endorse his paper as indicating the only correct and true basis of technical education. What Mr. Slingo had described might possibly be the true system of technical education for telegraphists, but he was quite convinced that in the county he represented such an interpretation of technical education would not work. He could not conceive that any technical school in Northumberland was going to efficiently train an engineer, or a ship-builder, or a miner, or even an agriculturalist, and he should like to enter his protest, and he hoped, with the approval of the Congress, against this limited definition of technical instruction being endorsed. He confessed he thought the reader of the paper was a little hard upon the outsider and the amateur, and particularly hard upon the institutions which he seemed to indicate preferred the outsider and the amateur to those who were engaged in the particular industries that the classes were established for. His own experience was in a contrary direction altogether. It seemed to him that if Mr. Slingo was going to ask them to spend public money for the exclusive benefit of a few particular industries or crafts, he would have to devise some means to enable them to meet the requirements of those useless outsiders and amateurs, who apparently wished to do nothing except invade the classes where they were not wanted. He did not think that Mr. Slingo's inference was correct, that the gentleman who got the prize in telegraphy was the best trained telegraphist in the kingdom. He did not believe the certificate of the City and Guilds Institute declared anything of the kind. The certificate would only state that the candidate had passed a particular examination on the syllabus. He hoped



that other members of the Congress, having in view what a very wide subject technical education was, would protest against the proposal that they should endorse Mr. Slingo's very limited definition.

Mr. T. TURNER said the first two speakers on Mr. Slingo's paper had spoken from the point of view of the polytechnics; the last speaker from the point of view of the country, and he, too, wished to speak from that point of view. Possibly, what Mr. Slingo said in his paper might have been correct five years ago, but it certainly did not fairly represent the position of technical instruction in the country now. In Staffordshire, for instance, they had a number of trade classes. They had a mining centre in North Stafford taught by a certificated mining engineer, one who had worked for a considerable time in a coal mine; in South Staffordshire they had a still larger centre for mining instruction taught by a properly qualified mining engineer, who had had to do with the management of a colliery; they had also a set of classes for the teaching of metallurgy, the teacher of which had for years been the chief chemist in the Yorkshire Iron Works, and in a Scotch Steel Works. All these classes were open to the general public, and yet, so far as he knew, there was not a single amateur attending any one of them. Mr. Slingo had also referred to the examiners under the City and Guilds of London Institute, and suggested that they had a difficulty in finding sufficient questions to set. He (the speaker) was one of those unfortunate people who had served his time as examiner under the City and Guilds Institute. Speaking from memory he believed he only had to set twenty questions each year, but he could easily have found a hundred on the subject of iron and steel manufacture; and he had no doubt the other examiners could have set an equally large number of questions on all the subjects with which the City and Guilds Institute had to deal.

Mr. E. PILLOW said he wished to support what Mr. Williams and Mr. Turner had said with regard to the limitations of technical education. It would be a great mistake to attempt to confine attendance at technical classes entirely to those persons directly engaged in a specific trade. Good apparatus and teaching power should be provided in the various institutions of those districts where special industries are carried on; the question of who shall be allowed to attend the classes will naturally regulate itself. In Crewe the superintendent and manager of the works always held out an inducement to their workmen to attend the classes and to make progress in the various subjects taught, especially the classes connected with iron and steel manufacture and mechanical engineering. Whenever classes were formed the London and North Western Railway Company provided money for good plant for the teacher's use, and men from the works who had distinguished themselves in the various branches were selected as teachers. Many of

the pupils were afterwards selected to become foremen in the works, and they had always given very great satisfaction. In conclusion, Mr. Pillow gave several instances, which had come under his own observation of men, who had risen to fill responsible positions, mainly through the instruction they had received by attending technical classes.

The CHAIRMAN, in closing the Sitting, said he wished to congratulate the Congress on the very interesting discussion they had had. He was afraid Mr. Slingo would find himself in a minority with regard to the paragraph to which so much objection had been taken. He thought Mr. Slingo should have remembered at the same time that nobody could learn a subject even theoretically without its being of some use to him. Supposing the amateur who passed an examination in carpentering was at the same time qualifying himself to become an architect, the extremely careful and technical, though merely theoretical, work which he had done in carpentering would always be of use to him. Therefore he thought we ought not to grudge the expenditure of a certain amount of money in theoretical education and the testing of the same by examinations. In the Corps of Royal Engineers to which he belonged, they took a great many young carpenters, smiths, bricklayers, and tradesmen of all sorts and put them into a school at Chatham, and there they were taught, theoretically to a great extent, the other building trades, and after two years' instruction they left as most efficient foremen of works, able to look after, not only the particular trade in which they were brought up, but all the other trades connected with the building of a house. He hoped technical education would remove the blot from those industries in which extreme division of labour prevailed to such an extent, that if a man's particular branch or work failed for any reason whatever, he was reduced to a state of poverty because he was unable to take up anything else.

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THURSDAY MORNING, JUNE 17, 1897.

#### SECTION B.

Sir STEUART COLVIN BAYLEY, K.C.S.I., C.I.E., in the chair.

#### RAPPORT SUR L'ENSEIGNEMENT COMMERCIAL SUPERIEUR EN FRANCE.

PAR JACQUES SIEGFRIED,

Membre du comité permanent du Conseil Supérieur de l'Enseignement Technique, président de l'Union des Associations des anciens Elèves des Ecoles Supérieures de Commerce de France.

Messieurs,

L'idée de créer des écoles spéciales pour les jeunes gens qui se destinent à la carrière com-

merciale est relativement moderne. Cela provient en grande partie de ce que les connaissances nécessaires au négociant se sont bien étendues depuis que les chemins de fer, les bateaux à vapeur, le canal de Suez, les télégraphes, les téléphones et toutes les admirables découvertes scientifiques des temps présents ont pour ainsi dire supprimé les distances et rendu le commerce intérieur de chaque pays tributaire des fluctuations et des modifications de celui du monde entier.

Autrefois pour être un bon commerçant il suffisait d'avoir une instruction moyenne complétée par un stage dans les bureaux d'une maison s'occupant du genre de commerce auquel on se destinait. C'était ce que l'on appelait "faire son apprentissage." Aujourd'hui chacun de ces commerces exige que l'on connaisse non-seulement la comptabilité et les usages commerciaux français mais encore que l'on soit au courant de ce qui se passe à l'étranger, que l'on puisse lire ou même parler plusieurs langues, que l'on soit familiarisé avec les monnaies, poids et mesures usités dans les divers pays, que l'on sache faire des prix de revient, des arbitrages, que l'on ne soit point étranger aux questions financières et même, dans une certaine mesure aux différentes législations commerciales, enfin que l'on soit au courant des marchandises produites et des articles consommés par les diverses nations.

La nécessité de ces connaissances s'est encore accrue par suite de la transformation qui s'est faite dans l'industrie. Autrefois l'industriel devait viser surtout à la partie technique; l'écart entre les prix de la matière première et du produit fabriqué était assez considérable pour que le succès fût assuré quand on produisait de bonne marchandise à un prix de revient modéré. La fortune souriait surtout à ceux qui savaient trouver ou appliquer quelque perfectionnement nouveau dans la fabrication. Aujourd'hui l'outillage et les procédés sont sensiblement les mêmes chez tous les concurrents; l'écart entre la matière première et le produit manufacturé a en outre, considérablement diminué; le succès de l'industriel dépend donc beaucoup de la manière dont il sait acheter la matière première et vendre les produits de sa fabrication. Et un mot l'industrie devient de plus en plus commerciale.

Si nous jetons un coup d'œil rétrospectif sur la marche de la civilisation, nous reconnaissons que chacun de ses progrès a amené la création d'écoles spéciales nouvelles. Les Ecoles de Commerce ont eu leur tour. On a commencé par celles du degré élémentaire et du degré

moyen et l'on est arrivé aux Ecoles Supérieures de Commerce.

L'objet de la communication que j'ai l'honneur de faire aujourd'hui devant le Congrès de Londres est relatif à ces dernières. Je ne dirai donc qu'un mot des enseignements du degré élémentaire et moyen et ce sera pour rappeler que c'est surtout en Allemagne qu'ils sont florissants et bien organisés. Nous avons toutefois en France d'excellents modèles d'école du degré moyen, de ce que l'on nomme officiellement chez nous des Ecoles pratiques de Commerce et d'Industrie, dans l'Ecole de Boulogne-sur-Mer, et dans l'Ecole Commerciale de l'Avenue Trudaine à Paris.

Quant à l'enseignement commercial supérieur, et tout en rendant hommage à l'excellent Institut de Commerce d'Anvers, j'espère ne pas encourir le reproche que l'on faisait autrefois aux Français de se croire plus avancés que les autres peuples (nos revers de 1870 nous ont obligés à devenir plus modestes) en osant dire que c'est en France que se trouvent en ce moment les meilleures Ecoles Supérieures de Commerce.

Nous en avons actuellement 11 et si nous voulons en faire l'historique nous devons avant tout rappeler le grand fait qui est venu, il y a quelques années, donner un nouvel essor à celles qui existaient déjà et provoquer de nouvelles créations. Je veux parler de la loi du 15 juillet, 1889 sur le recrutement de l'armée française et de son article 23 qui donne aux élèves diplômés des Ecoles supérieures de Commerce reconnues par l'Etat la faculté de faire seulement un an au lieu de trois années de service militaire.

Cette loi devait naturellement avoir pour effet d'accroître le nombre des élèves de ces Ecoles, mais elle avait aussi pour corollaire de leur imposer un programme, un concours d'entrée, une limitation du nombre de leurs élèves, enfin des examens de sortie devant des jurys nommés par l'Etat.

Celles de ces Ecoles qui avaient été fondées avant la loi de 1889 étaient dues surtout à l'initiative individuelle; depuis lors ce sont les chambres de commerce des différentes régions qui en ont créé et qui les administrent.

Toutes ces Ecoles ont le même but: préparer leurs élèves à devenir de futurs chefs ou principaux employés d'établissements commerciaux ou de maisons de banque, des directeurs de comptoirs à l'étranger, des agents consulaires capables de représenter dignement la France dans les relations du commerce international.

Depuis la loi de 1889 leurs programmes sont

devenus sinon uniformes du moins assez semblables. Le fond en est le même, mais chaque école y ajoute des cours spéciaux plus particulièrement adaptés aux besoins de la région dans laquelle elle recrute ses élèves.

Elles n'admettent toutes que des jeunes gens d'au moins 16 ans, mais ils sont en général passablement plus âgés; il n'est pas rare d'y voir des élèves de 20 ans et au-delà. Ils sont en grande majorité externes. La durée des études est de deux ans, mais presque toutes les Ecoles y joignent une école préparatoire de un an.

Les cours occupent une moyenne de 33 heures par semaine; le reste du temps est employé par les élèves pour la rédaction de leurs notes.

La base de l'enseignement est ce qu'on pourrait appeler le bureau commercial; c'est là que pendant 10 à 11 heures par semaine on enseigne la comptabilité sous toutes ses formes, factures, comptes courants, journal, grand-livre, bilans, monnaies, poids et mesures des différents pays, calculs de prix de revient, arbitrages, de change et de valeurs, etc., etc.

La géographie économique et commerciale occupe 3 heures par semaine; ou y passe en revue les ports et grands centres commerciaux ou industriels, les productions, importations, exportations, de chaque pays et de ses colonies, les voies de communication, etc., etc. Comme corollaire à ce cours on consacre environ une heure par semaine à l'histoire du commerce.

Un cours de marchandises de 3 heures par semaine fait passer sous les yeux des élèves les principaux produits, les met à même de reconnaître les conditions qui en déterminent la valeur, les renseigne sur le commerce auquel ils donnent lieu, etc., etc.

On consacre 2 heures par semaine à la Législation commerciale, maritime et industrielle et une heure à la législation ouvrière, fiscale, douanière et à l'économie politique.

La calligraphie n'est pas négligée et occupe de une à deux heures par semaine.

Les langues vivantes sont considérées comme une des bases de cet enseignement; l'anglais y est obligatoire et prend 4 heures par semaine, une seconde langue occupe aussi 4 heures par semaine consacrées, aux choix des élèves, soit à l'allemand, soit à l'espagnol, l'italien ou même l'arabe.

Enfin, chaque Ecole, suivant les besoins de la région dans laquelle elle se trouve, accorde 2 ou 3 heures à des cours spéciaux, tels que l'armement, l'étude des transports, la microscopie, la technologie, la sténographie.

Tel est dans son ensemble le programme des

Ecoles Supérieures de Commerce de France; il a donné jusqu'ici toute satisfaction.

Il me reste maintenant, Messieurs, à vous donner les noms et à vous présenter un historique, aussi abrégé que possible de nos Ecoles.

La plus ancienne est l'Ecole Supérieure de Commerce de Paris. Elle a été fondée en 1820 par deux négociants parisiens, Messieurs Brodard et Legret, fut dirigée de 1830 à 1854 par Adolphe Blanqui et a pour directeur depuis une quinzaine d'années Mons. Grelley. Un de ses professeurs les plus distingués a été pendant de nombreuses années Mons. Joseph Garnier, que beaucoup d'entre vous ont certainement connu.

La Chambre de Commerce de Paris à laquelle elle appartient depuis 1869 et qui l'administre au moyen d'un Comité pris parmi ses membres, va consacrer une somme de un million et demi de francs à l'agrandir considérablement, et la Ville de Paris vient de lui allouer une subvention de 600,000 francs. L'Ecole ne reçoit que des internes et des demi pensionnaires; le prix annuel est de 2,000 francs pour les premiers, de 1,000 francs pour les derniers. Il est annexé à l'Ecole un cours préparatoire de une année. Le nombre des places mises au concours pour les examens d'entrée de cette année-ci est de 60, ce qui montre que l'Ecole a environ 120 élèves, non compris ceux du cours préparatoire.

Depuis sa création cette Ecole a vu passer sur ses bancs environ 7,000 élèves dont un grand nombre occupent aujourd'hui des positions importantes dans le commerce et l'industrie. Le programme des études se distingue de celui que j'ai décrit plus haut par une plus grande subdivision qui permet de spécialiser les mathématiques, la géométrie, la chimie et d'adjoindre des cours de technologie, de mécanique, de sténographie, et de dessin linéaire. Pour accomplir tout ce programme il a fallu porter à 36 heures par semaine le nombre des classes.

La seconde Ecole créée en France a été celle de Mulhouse fondée en 1866 par la Société Industrielle sur l'initiative de deux de ses membres. Cette Ecole dirigée par Mons. Achille Penot et dont les programmes ont servi de modèle à toutes celles qui ont été fondées ensuite fut malheureusement obligée de fermer ses portes à la suite de la guerre de 1870, le gouvernement allemand voulant exiger que ses cours se fissent en langue allemande. Son corps enseignant se transporta à Lyon qui s'occupait précisément, à ce moment-là de fonder une Ecole.

L'Ecole Supérieure de Commerce du Havre

s'est ouverte en 1871 ; elle a été fondée par un groupe de négociants réunis en société par actions au capital de 220,000 francs, et elle a été cédée ensuite à la Chambre de Commerce qui l'administre actuellement. Elle ne reçoit que des élèves externes moyennant 600 francs par an pour ses cours normaux et 400 francs pour son cours préparatoire. Son Directeur est Mons. Dany. Le nombre des places mises au concours pour les examens d'entrée de cette année-ci est de 40. Un seul cours est ajouté au programme général, c'est une heure par semaine d'armement.

L'Ecole Supérieure de Commerce de Rouen s'est aussi ouverte en 1871, fondée par la Société Civile pour le Développement en Normandie de l'Enseignement Industriel et Commercial au capital de 250,000 francs. Elle a été réorganisée l'année dernière et mise sur un excellent pied par la Municipalité de Rouen. Elle reçoit des externes payant 600 francs, des internes payant 2,400 francs et des demi pensionnaires payant 1,050 francs. Elle a un cours préparatoire. Son Directeur est Mons. Malepeyre. Le nombre des places mises au concours pour cette année-ci est de 35. C'est l'Ecole de Rouen qui a eu l'honneur d'inaugurer les cours de microscopie commerciale et de tarifs de chemins de fer.

L'Ecole Supérieure de Commerce de Lyon a été fondée en 1872 sous forme d'une société par actions au capital de 1,120,000 francs. Elle est placée sous le patronage de la Chambre de Commerce et administrée par un Conseil composé de 13 membres. Elle ne reçoit que des externes à raison de 600 francs par an pour ses cours normaux et de 500 francs pour son année préparatoire. Son Directeur est Mons. Saint-Cyr Penot, fils de l'ancien Directeur de l'Ecole de Mulhouse. Le nombre des places mises au concours pour les examens d'entrée de cette année-ci est de 80. A leur entrée à l'Ecole les élèves sont groupés en trois sections suivant qu'ils se destinent : 1° à la banque ou au commerce général ; 2° au commerce spécial des soieries ; 3° au commerce des matières tinctoriales et des produits chimiques.

L'Ecole Supérieure de Commerce de Marseille a été ouverte en 1872 sous le patronage de la Chambre de Commerce. Elle est un externat et la rétribution de ses cours est de 600 francs par an pour l'enseignement normal et de 400 francs pour l'année préparatoire. Les élèves peuvent prendre leur repas de midi à l'Ecole moyennant 40 francs par mois. Son Directeur est Mons. Lejeune, ancien élève de l'Ecole de Mulhouse. Le nombre des places mises au concours pour l'année 1897 est de 65.

L'Ecole de Marseille se distingue par des cours de langue arabe et de langue grecque et par des conférences dans lesquelles les élèves ont à traiter, à tour de rôle, en présence de leurs camarades, diverses questions de comptabilité, de géographie commerciale, de marchandises, de législation ou d'économie politique. Il leur est interdit de lire leur travail, mais ils ont le droit de se servir de notes. L'Ecole de Marseille a aussi une section de la Marine marchande pour les aspirants au grade de Capitaine de la Marine marchande.

L'Ecole Supérieure de Commerce et d'Industrie de Bordeaux s'est ouverte en 1874 sous la direction de la Société Philomathique, avec le patronage et le concours du Conseil Général, de la Ville et de la Chambre de Commerce. Son Directeur est Mons. Manès. Elle ne reçoit que des externes au prix de 400 francs par an pour les cours normaux et de 200 francs pour le cours préparatoire. Le nombre de places mises au concours pour l'année 1897 est de 60. C'est à Bordeaux et sous l'impulsion de la Société Philomathique que se sont tenus en 1886 et en 1895 les deux Congrès internationaux de l'Enseignement technique qui ont été si remarquables et ont tellement contribué au développement et à l'amélioration de l'Enseignement commercial.

La plus importante, la plus richement dotée des Ecoles de Commerce est l'Ecole des Hautes Etudes Commerciales de Paris, conçue par Mons. Gustave Roy, Président à cette époque de la Chambre de Commerce de Paris et ouverte en 1881. Cette Chambre y a consacré deux millions de francs. Elle est administrée par un Comité de membres de la Chambre de Commerce et a pour Directeur Mons. Jourdan. On y reçoit des internes payant 2,200 francs, des demi pensionnaires à 1,300 francs et des externes à 1,000 francs pour les cours normaux, et 2,200, 1,300 et 1,000 frs. pour le cours préparatoire. Le nombre des places mises au concours pour les examens d'entrée de 1897 est de 135.

L'Ecole a eu l'excellente idée de publier une statistique indiquant les situations occupées en ce moment par les élèves qui ont suivi ses cours de 1881 à 1895. Ils ont été au nombre de 1,150 sur lesquels 461 sont dans le commerce, 506 dans l'industrie, 36 dans la banque, les assurances ou les chemins de fer, 8 dans le Professorat commercial, 35 dans les consulats, chancelleries ou ministères, 3 sont sans profession et 21 sont décédés ou perdus de vue. Cette statistique est certainement le plus bel éloge que l'on puisse faire de l'enseignement commercial en général et de l'Ecole des Hautes Etudes en particulier.

L'Institut Commercial de Paris date de 1884. Il a été fondée par un groupe de négociants parisiens désireux de diriger les jeunes gens vers le commerce d'exportation. Son Directeur est Mons. Bernardini, ancien professeur à Mulhouse. Le nombre des places mises au concours pour les examens d'entrée de cette année est de 45.

L'Ecole Supérieure de Commerce de Lille et de la Région du Nord a été reconnue par l'Etat par décret du 12 juillet 1892. Elle est placée sous le patronage des Chambres de Commerce de Lille et des villes environnantes. Son Directeur est Mons. Trannin. Elle ne reçoit que des externes au prix de 700 francs par an, tant pour les cours normaux que pour l'année préparatoire. Le nombre des places mises au concours pour les examens d'entrée de cette année est de 45.

Enfin Nancy vient d'ouvrir sous la direction de Mons. Lapointe, et Montpellier se prépare à fonder sous la direction de Mons. Cantagrel des Ecoles Supérieures de Commerce qui, profitant de l'expérience de leurs devancières, seront dignes, je n'en doute pas, de la haute mission qu'elles se proposent.

Tel est, Messieurs, l'état actuel de l'enseignement commercial supérieur en France. Si j'ajoute que l'Etat lui est absolument favorable et qu'outre la faveur du service militaire d'un an, il accorde à nos Ecoles Supérieures des facilités pour l'entrée dans les carrières diplomatique et consulaire, dans les chancelleries, dans l'Administration des Douanes, dans l'Ecole Coloniale et met libéralement à leur disposition des Bourses de voyages et de séjour à l'étranger; si je rappelle que chacune des Ecoles a son Association Amicale de ses anciens élèves et qu'enfin ces différentes associations se sont groupées en une importante Union des Associations des anciens Elèves des Ecoles Supérieures de Commerce reconnues par l'Etat, je crois qu'il me sera permis de terminer en disant que l'Enseignement Commercial Supérieur de France mérite l'attention des personnes distinguées qui se sont réunies pour former le Congrès de Londres.

#### SUGGESTIONS ON COMMERCIAL EDUCATION.

BY H. W. EVE, M.A.

Headmaster of University College School, Dean of the College of Preceptors.

Some years ago the London Chamber of Commerce, in connection with several persons

experienced in education, drew up a somewhat elaborate curriculum for commercial education based mainly on foreign models, and instituted an examination with a good many money prizes for lads of 16 and 17 about to enter business. A similar examination was for several years carried on by the University of Oxford. There is no doubt that these efforts have done something to raise the standard over a limited field, but it may be questioned whether they have entirely answered the object of their promoters in recruiting the ranks of commerce with a body of highly educated young men, and supplying such young men with the *carrière ouverte aux talents*.

It may be that a first-rate general education is not a factor, or is only an insignificant factor, in producing a good man of business; it may be that, as some think, it is best for a lad to go into an office as soon as he can write a decent hand and add up a column of figures, and to be set to work to stamp letters and run errands. If so, I am afraid it is superfluous for a schoolmaster to take up your time. But I gather that a different view prevails among enlightened men of business; that making due allowance for the many qualities that tell in a commercial career, they do believe that a good general education is an important element in business as it is admitted to be in the army, in the legal and medical profession, and the higher branches of the Civil Service. In several lines of business, such as that of an actuary, a patent agent, or a chartered accountant, both a preliminary and a special examination are required, and several banks exact some test—not, it is true, a very high one—of general attainment. That an examination test of any severity should be applied to ordinary clerks is probably out of the question; the work is too dull, and the pay and prospects too small to be tempting to the highly educated. But among the lads who crowd into overstocked professions, or are sent to the university at a considerable sacrifice, only to find themselves stranded at 22, there is a large amount of good material which might be utilised for the development of the commerce of the country, if a more attractive career were opened to them. At present, private connection apart, there is an effectual demand in business for intelligent lads of 15 or 16, and next to none for those of 18 or 19. We want, in fact, an effective machinery for bringing more of the educated ability of the country into the higher walks of business. The Chamber of Commerce plan seems to me to fall between

two stools. It implies an education—and that partly technical—completed about 16, and rising above the standard necessary for an ordinary clerk; it does not reach the standard of a good professional student. The best educated men of business, including many men of university distinction, have, as a rule, started some way up the ladder in virtue of private connection and influence. There seems no adequate reason why the number of such men should not be increased, and why they should not be drawn from a wider field.

One obvious method suggests itself—the method which has done so much to raise the standard of the army and the higher branches of the Civil Service at home and in India. Why should not great firms combine to offer at any rate a small number of good posts, on an examination based upon the ordinary curriculum of schools, to lads of 18 or 19, giving a large choice of subjects, and including, of course, a qualifying examination in arithmetic, a modern language, and English composition? The selected candidates should be required, a few months after this examination, to pass in book-keeping, and perhaps in shorthand. They should then be taken into offices and placed in positions where they would have the opportunity of learning, and be exempted as much as possible from the drudgery of ordinary clerks. They should, in fact, do no more mere clerical work than is sufficient to enable them to direct others. An engineer works in shops not in order to become a workman, but in order to become a director of workmen, and the training of men for the higher walks of business might, it seems reasonable to believe, follow analogous lines.

But while I should hold that any good general education would be sufficient, it is not unnatural to prefer the curriculum of the modern rather than that of the classical side of schools. I will proceed, then, to sketch in some detail the line of education which seems best adapted for lads leaving school at 18, and intended to be officers rather than privates in the army of commerce, premising, of course, that something must be conceded to individual taste and that a study pursued *con amore* is generally the most effective mental discipline. On the whole, the literary, rather than the scientific, elements should predominate in their education, just as mathematics and physical science predominate in the training of an engineer. In the higher walks of business, men have to deal with economic problems, with

political conditions, with questions approaching as near to law as a layman dare venture, and with that general knowledge of foreign countries which is necessary to anyone who is anxious to extend his operations. For all these purposes, width of reading and the power of collecting facts and drawing inferences from rather extensive materials is necessary—probably more necessary than the rigorous methods of physical science. Add to this, that in some form or other a knowledge of some foreign languages and facility in acquiring others is in most cases essential.

Classics should take quite a subordinate place. Clever boys generally begin Latin early, and by 14 or 15 have learnt enough to profit by its mental discipline, and to make the acquirement of other languages comparatively easy. Moreover, the difference between the classical knowledge of an intelligent boy of 14 and a matriculation or “little-go” standard is often hardly worth the time spent on it. On the other hand, it is possible between 14 and 18 to gain a knowledge of at least two modern languages, combining practical utility with intellectual discipline of a high order. It is possible, too, within those limits to read widely enough to lay the foundation of a taste for literature, an object which is seldom attained by a classical education cut prematurely short.

The selection of languages is rather a difficult problem. A gentleman who has given a great deal of thought to commercial education, Mr. Hooper, has gone so far as to suggest that different schools should make a speciality of different languages; Spanish, for instance, being taken in one, Russian in another, and so on. The two languages most studied, French and German, are by no means the only ones useful for commercial purposes, perhaps not the most useful for the extension of commerce. On the other hand, the educational machinery in the way both of books and of competent teachers is far better in the case of those languages than of any others.

To teach any language efficiently, you require, at least, four successive classes, and, therefore, some 50 or 60 boys in a school studying that language. As a matter of practice, the boys of an average school studying French fall into a dozen classes, those studying German, which is generally begun later, into quite half-a-dozen. There is, then, much to be done before any other language can be successfully introduced as a school subject. Even French

and German teaching is, in many schools, less systematically organised than that of Latin and Greek.

Next, a word or two as to method. There have always been two opposite views as to teaching modern languages. With one set of teachers, fluency, with the other, accuracy has been the main object. There is a growing conviction that the one ought to be done, and the other not left undone. It is recognised that a modern language can hardly be said to be known, when a candidate for examination cannot pronounce properly, write readily and correctly from dictation, and answer simple questions in the language. On the other hand, it is a common complaint that children who have had early opportunities of talking a language, without systematic grammar training, are very apt to fail, both in writing it correctly, and in translating from it into English with anything like accuracy. It is awkward, for example, to miss entirely the meaning of a German sentence from ignorance of the subtleties associated with particles like *doch*, *schon*, and so on. Even translators of considerable general attainments come to grief occasionally for want of accurate scholarship. I see no reason for neglecting the conversational side, but it should be subordinated to that habit of accurate translation both from and into a foreign language, which is essential both for mental discipline and for real mastery of it. As to reading, let us have literary masterpieces as soon as a boy can understand them, and let an effort be made to read some books rapidly while others are studied with the minutest care. Commercial correspondence is nearly as much out of place at school as the technicalities of legal documents. A boy who can turn Lessing's *Laocoon* into good English, and a passage of Macaulay into passable German, will not take long to learn how to "apologise for delay in the execution of your esteemed order."

Perhaps I have spent too much time on modern languages, but I look upon them as the backbone of the type of education I am sketching. Briefly, I would have a boy up to about 14 trained, as far as language is concerned, on Latin, French, and the elements of German. He should then drop Latin, make either French or German his *pièce de résistance*, and set systematically to work at an additional language. The other parts of the curriculum may be more briefly dealt with.

English should, of course, have an important place. Composition must be practised, and a little time may well be found for *précis*-writing,

which teaches the habit of getting clear information out of a mass of details, and of putting it into shape. And the more English literature the better, and that not only for the reasons given above, but for the sake of keeping in touch with the educated world, and as an antidote to meaner tastes, including the silliest and most vulgar of them all, that for betting on horse-races, which is not unknown in the city.

Arithmetic is an absolute essential, and should have more time given to its higher parts than is ordinarily the case. It is surprising how few people, for example, really think in decimals. They are not indeed as bad as a well-known Chancellor of the Exchequer to whom the meaning of certain dots (I believe he qualified them by an un-Parliamentary epithet) was a revelation, but while most of us understand '5, many educated people do not at once realise the meaning of '875. Indeed to think at all in numbers is a difficult and by no means too common accomplishment. Even in my own profession, I have met with intelligent men to whom the assignment of marks of boys' work was always more or less of a mystery. In mathematics, I see no reason for going very far, except in the case of special aptitude. In science, I should be disposed to prefer the elements of botany and geology to those of physics or chemistry. Time is a consideration, and not only are botanical and geological facts of more direct value to a man of business, but the methods of reasoning of these sciences seem to have more analogy with their future work. Recent examinations for commercial certificates make a strong point of commercial geography. The proper treatment of this subject is a question rather of method than of actual range of knowledge. To understand trade routes and the capabilities of different countries means a considerable acquaintance with what the Germans call *Erdkunde*; and, thanks to the efforts of the Royal Geographical Society and the Geographical Association, much progress is being made in this direction. But it ought not to be forgotten that familiarity with the names and positions of places, which some advanced geographers are apt to look down upon, is a kind of information by no means to be despised. Lastly, the elements of political economy are absolutely essential, and the subject is one which lends itself extremely well to school teaching in the higher classes. Many of the problems are quite within the range of boys, and there is no better exercise in English composition than the

answering of simple economic questions. It is a study, too, for the continuation of which special facilities are offered by the Economic Institute. Commercial history, it would seem, should be combined with political economy. It is the surest way of eliminating details of antiquarian rather than practical interest, such as are apt to find their way into a text-book written exclusively from the point of view of commercial history.

In conclusion, I would hope that such a curriculum as I have sketched is not beyond the powers of schools to carry out, nor likely seriously to interfere with their natural routine. But I cannot say with Alceste, "*Le temps ne fait rien à l'affaire.*" In point neither of quantity nor of quality is such a curriculum adapted for boys who leave school before 18, and to attract clever boys of 18 into houses of business adequate inducements must be offered.

#### COMMERCIAL EDUCATION AND THE NEED FOR A SCHOOL OF COMMERCE.

BY DR. RICHARD WORMELL, M.A.  
Headmaster of Central Foundation Schools of London.

It is well that commercial education has a distinct mention in this Conference. We have in the last few years done much to clear up the relationship and co-ordination of special kinds of education needed by different sections of the community. The definitions contained in the Report of the Royal Commission on Secondary Education led to the inclusion in technical education of secondary and commercial education.

As regards secondary education the report says:—"It is the education of the boy or girl not simply as a human being who needs to be instructed in the mere rudiments of knowledge, but it is a process of intellectual training and personal discipline conducted with special regard to the profession or trade to be followed."

In this definition the education of professional men and women, and also that of men and women engaged in commerce are both included. Now, in commerce, there are two sections of operators: there are the producers and the distributors of the world's goods. Some technical educationists have perhaps been exclusively looking at the educational wants of the producers. The two sides have an equal right to be considered, and each has a special right to be heard as

regards its own special needs. The questions proposed by either side do not involve the imposition of the same kind of education on all members of the community; on the contrary, they emphasise the necessity for providing for individual and special wants.

The movement for technical education was intended, in the first place, to stimulate the producing powers of the community, and, similarly, the movement for commercial education is intended to assist the distributing classes, consisting of merchants, clerks, warehousemen, travellers, buyers and sellers, actuaries and bankers, by causing a corresponding improvement in the education of those who are destined for a mercantile career.

Now there are so many considerations common to both sides of the question that I prefer to include both as kinds of technical education. In regard to both sections—the technical education of the producers, and the technical education of the distributors—there are two points to be distinguished. The first involves the question, "How can the schools assist the needs of these classes by the work which is antecedent to the period of specialisation?" The other involves the question, "What provision should be made for the study and training which follow the selection of employment, and consequent specialisation?"

It was long ago settled that there are two stages in education more or less overlapping, and yet distinct—one aiming chiefly at the development of faculty, the other at its application. There is the making of the man, and there is the making of the man into a merchant, a fabricator, a worker of some sort. There is first the awakening of intelligence and forming of character, and then there is the acquiring of the knowledge and skill in matters specially pertaining to business. Now, when trades were less complex and businesses were small, the two conditions of success were sought one after the other—the first at school, the second in business, the good master teaching his good apprentice the secrets and intricacies of his craft. The subdivision of labour and the aggregation of businesses into great concerns, together with their complication by the introduction of scientific machinery, made the old modes of training for business well nigh impossible. The apprenticeship system decayed. The great movement to which I am referring arose in search of a substitute. Some have supposed that the change can be met by the schools. This is an error. The two stages of educa-



tion cannot be welded, cannot be reversed. In the search for a substitute for the second, it was, however, fairly asked of the schools that they should take up a little of the special work, such as might consist of the choice of the more useful subjects when alternatives were offered between subjects similar in character and equally effective as mental discipline. But the danger of specialising too soon is a conviction from experience in the case of schoolmasters. We believe it would be disastrous as regards education if we were to yield to any pressure to encourage specialising in schools. When the schools have contributed all they can towards meeting the demands of modern times, there will still remain the need of a substitute for apprenticeship. The drapers, the mercers, brokers of all sorts—even actuaries, and the bankers, too—had their articulated pupils or apprentices, and in this section of trade as well as in the other the apprenticeship system has declined. The technical and commercial movements spring from the same cause and are of the same nature. They have a common *raison d'être* in the limitations that necessarily attach to the aims of the schools and the necessity for an education beyond these limitations. The schools lay the common foundation.

Take all the demands made upon us by all employers and directors, merchants, manufacturers, engineers, professional men and statesmen, select from them the part which is common, and you find it consists of a demand for intelligence, wisdom, sagacity, soundness of judgment, clearness of perception and common sense, and these are the products of a sound and broad general education. We may perhaps add what was said by the almost forgotten Andrew Yarranton, nearly two centuries ago:—"Common honesty is as needful in kingdoms and commonwealths that depend on trade, as discipline is in an army; and where there is want of common honesty in a kingdom or commonwealth, from thence trade shall depart. As the honour, honesty, riches and strength of nations are, so will be their trade. These are five sisters that go hand-in-hand, and must not be separated." Hence, honour, honesty and strength of character are the first things to be sought for, and these are to be developed in the schools. That trade-knowledge, which must be added to them to produce success, is not a matter for the schools. The chief special need is found by those who, having selected their occupations, find there are special subjects in which they require the help formerly

given to apprentices. These do not so much need stimulus as an opportunity. They should in this great city be able to get the best possible teaching for a very small cash outlay on their own part. For the higher and most special of the special training there ought to be a commercial institute, independent of any college or university. It is advisable that those who would seek the aid of such an institute shall find in it other students who are on the same kind of expedition, so that their attention may not be diverted or their enthusiasm cooled.

Long since I pointed out that we need here neither examinations nor examinees, but teachers and learners, and a temple of commerce, where these two classes will be brought into contact. Much energy and some wealth have been spent in the movement for commercial education, but only one small item of permanent provision has been secured, namely, the new School of Economics, of the London County Council. This is, however, but a small approach to the realisation of a sufficient scheme. It should be supplemented by a complete School of Commerce the work of which should treat of every function used in the production and distribution of wealth. Such a school is wanted for individual help. Those who would go to it would not require many subjects and yet the whole demand would be very varied. Each comer should be allowed to pursue only the knowledge he or she individually seeks, and should be helped to it in the shortest possible time under the best possible guidance, and at the least possible monetary cost to himself. He should find there a way to get into contact with those men of business who have the best knowledge of the things, or processes, or methods he wishes to learn. Hence, in addition to a permanent staff the school of commerce should be able to call to its aid for periods long or short, as the case requires, the highest skill, the widest experience, the best business capacity. This plan of securing professional aid from outside the ordinary teaching profession is well known in France. For instance, I found at the College at Saint Cloud that space was provided in the time-tables for lectures and conversations by leading writers, workers, and thinkers of Paris, some being engaged in literature, others being members of the Chamber of Deputies. Such a plan would be a necessity of the school of commerce or commercial institute.

The commercial institute should be placed

where the clamour and pressure of business put themselves in evidence, where the atmosphere is full of them. The Universities fortunately have another atmosphere. In them very different influences address the young, and combine in moulding character and sentiment. In them the student's surroundings speak to him with the voices of many ages. They speak not only of the present, but they also attest the continuous life and greatness of his country, and the magnanimous liberality of England's ancestors. Who would wish to convert the universities into commercial institutes if it were possible to do so. It is, however, not possible.

Yet in the focus of trade there seems to be needed a place where the best information and the best trade methods can be obtained; where any kind or system of book-keeping for any kind of complication whatever can be learnt; where he who wants Spanish or Russian or any other speech can get it taught him at a small cost by the best teachers; where commercial law or commercial lore of any kind can be provided without stint; where he who simply wants to know how to do this, that, and the other, can be introduced to him who has already found it out; and, most important of all, where those merchants who are prepared to pay the price can find an employee with all the qualifications they may require.

Mr. G. H. RENDALL (Principal, University College, Liverpool) said it might be useful to cite some of his experience of the difficulties which beset the development of commercial education, both in schools and colleges. He was not sure that the university college was not a more hopeful organ of higher commercial education, at any rate, than the school. Mr. Eve had given them a striking and valuable paper upon an ideal system of commercial education in schools, and the main factor that he brought into consideration was the question of age. He had said that for boys of 14, 15, or 16 years of age there was an effective demand, but that for boys of 18 there was practically none. That was the real difficulty of the whole problem. The same thing was true of Liverpool schools, and their experience was corroborated by the university college. From the best schools there was any quantity of demand for boys up to 15 years of age. The leaders of commerce distinctly preferred, indeed, almost insisted, that the school-leaving age should not be above 15, or at the outside 16; and in the offices of merchants the boys who obtained places carrying the promise of promotion to the positions of trust and profit were nephews, or cousins, or sons of one of the partners in the firm; these boys obtained places by means of this influence, which would be

denied to those of superior training coming from school at the age of 17 or 18. It was a most difficult matter in large banks, insurance offices, merchants' offices, and the like, to give precedence on the ground of superior training. He knew men in Liverpool who were warmly interested in educational matters, who had shown the most hearty goodwill in the cause by contributions in the form of money, by interest in the form of advocacy, and by favour shown to those clerks who were educating themselves, who yet found it almost impossible to reduce the term of apprenticeship in favour of those who came with some testimonial from school or college. That was the great difficulty for students in schools. The modern commercial man, who was really interested in commercial education, when he came upon the educational platform, threw the emphasis continually upon good writing, shorthand, and on cyphering, and they could not have a higher education that limited its basis to good writing, shorthand, and arithmetic. He was not speaking of the Philistine, but of men interested in education who, instinctively and intuitively, threw the whole emphasis upon the importance of those mechanical arts. More and more business was tending to centre itself in the hands of the business director, who sat at his desk with his speaking tubes and telephones, and dictated to his shorthand clerks, and expected purely mechanical assistance—not relying upon the intelligence of his clerk, as the statesman did upon his private secretary, by saying "Answer this letter in that sense," but rapidly dictating it to his clerk, and having it taken down word for word. They had tried to develop commercial science in connection with the university college, and for this reason—that just those subjects upon which Mr. Eve had dwelt were not taught at the schools, and it was hardly possible to get competent teachers for them. He did not allude mainly to modern languages, for in that department it was fairly easy to secure competent teachers, both in regard to pronunciation and grammar. But when they came to commercial law, and history, and political economy, it was almost impossible, amongst ordinary schoolmasters, to find one who had made a study of these subjects, and proper text-books were almost entirely lacking. Therefore, it seemed fairly well worth while, as they had a professor, charged with subjects ranging over political economy, commercial geography and history, to develop that side of the curriculum. The success had been extremely small, and what it practically resolved itself into was two or three youths, out of a very large community, taking their two or three year courses of the business curriculum. The large banks and institutions all promised support, but the net result was the entry of two or three students annually, who were almost invariably the sons of men in business—not young men who hoped to get places on their merits, but sons of men who, being heads of business firms, wished their sons to take an intelligent interest in the subjects to which their lives would be devoted. In that respect they had got a fair response, but, of course,

that was not the kind of thing which Mr. Eve was looking for.

M. E. SÈVE referred to his paper read on the previous day in Section A, as that dealt with commercial as well as technical instruction, and explained his views on this subject as taught in Belgium.

M. ALBERT BRETON (Paris) said he wished to make a few remarks on the report of M. Jacques Siegfried. He was not a professor, but he was very well acquainted with commercial and technical education as pursued in France. He had been a pupil for five years in the elementary and superior schools, and if he could not give his experience as a professor, perhaps they would allow him to give his experience as a pupil in those schools. Among the superior schools in France is L'Ecole des Hautes Etudes Commerciales, which was created by the Paris Chamber of Commerce, and was to represent the highest degree of commercial education, as stated by the President, Mr. G. Roy. According to this gentleman, there were three degrees of commercial education—1, the elementary degree; 2, the superior degree; 3, the high degree. It had for its object the reception of scholars who had completed their classical studies, and were Bacheliers ès Sciences or Bacheliers ès Lettres. It was recognised that it was useless to expect a boy of 13 years of age to train himself specially for a certain trade or profession, whereas at 16 years of age he might reasonably be expected to have predilections which he could cultivate. But, for a long time, the commercial profession was not held in very high esteem, with very few exceptions, on the Continent. Therefore, the Paris Chamber of Commerce wanted to give an opportunity to the young men who wished to devote themselves to commerce, and principally to the sons of their merchants, among whom very few used to follow their fathers. It was with that object that the Ecole des Hautes Etudes Commerciales was provided in Paris in 1881. Its intention was to make the same difference between other superior commercial schools and that school as existed to-day in France between les Ecoles des Arts et Metiers, and l'Ecole Centrale des Arts et Manufactures. The pupils received excellent instruction, which proved its value when they had left school, and to-day the Chief of the Commercial Education Bureau in the Ministry of Commerce was an old pupil of that school. Since the passing of the law of 1889 the tendency had been to affiliate every other commercial school with the Ecole des Hautes Etudes Commerciales, so that the law which had done so much good for the pupils themselves had done great harm to the Ecole des Hautes Etudes Commerciales. The establishment of a third year at the Ecole des Hautes Etudes Commerciales was spoken of at the late International Congress at Bordeaux, and the suggestion was supported by some professors. This measure seems unnecessary, for it should be re-

membered that, if they devoted two years to commercial education—which was an excellent thing—they lost two years of commercial practice, and two years of commercial education ought to be enough to make a good merchant.

## COMMERCIAL EDUCATION IN ENGLAND AND AMERICA.

BY BERNARD DE BEAR.

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In preparing this paper, one of the main objects has been to endeavour, as far as possible, to remove the extraordinary misconception that exists in the public mind as to business training institutions and their methods in this country. Quite recently I was present at a debate on "Commercial Education," which took place under the auspices of the London Chamber of Commerce. One of the principal speakers at that discussion was a prominent member of the London County Council, one indeed, whose special energies have been directed to the subject of education in various forms, and I was astounded to hear from his lips the utterance that "commercial business colleges were practically non-existent in this country, or in other words, that no gentleman would care to send his children to such as were established." It is with the object of combating such injurious and reckless statements as these, that I have brought together a few facts in order to show what is being done for commercial education in this country by private enterprise and energy alone, and that despite the sneers of those who should be its well-wishers, if not its supporters.

As to the statement I have quoted, I will content myself by saying that it is absolutely untrue. The institution with which I have the honour to be connected is the parent institution of the kind in this country, and has been in existence for twenty-seven years, in the course of which it has received as pupils members of the highest families in the land, representatives of all the learned and honourable professions, and, in short, a patronage of as good status and social position as that bestowed upon any of the best public schools in the kingdom.

In the spring of 1895, I paid a visit to the United States, with the object of inquiring into the methods of business training in America. I visited over twenty of the best business training colleges on the other side of the Atlantic, in such cities as New York, Philadelphia, Washington, St. Louis, Chicago,

Detroit, Cleveland, Albany, and Boston. In the States, at any rate, I found that students at these colleges were drawn from the very best families in the country, and though it is inevitable that the class of student at a business college, whether in England or America, should be a mixed one, yet it is a fact that the large majority of the pupils represent what we call "the middle and upper classes." These institutions play an extremely important part in the business life of the United States, for not only is a finishing course in business considered a fitting termination to the young American's educational career, but the majority of the business houses in the different cities of the States depend upon these colleges for the supply of assistants to be engaged either as book-keepers, stenographers, typists, or in any other capacity.

As a rule, the American business college insists upon its students taking up a complete course of study as mapped out in its prospectus; unlike the method adopted in this country, as I shall presently show. The fees for tuition average about \$35 to \$40 per term of ten weeks, or \$100 per year; say, £20 of English money.

The commercial course of study comprises book-keeping—single and double entry—commercial arithmetic, penmanship, commercial law, business correspondence, business forms and methods, banking, insurance, commission, real estate, transportation, brokerage, wholesale, retail, importing and jobbing. There is usually a separate course for shorthand and type-writing, which includes grammar, spelling, dictation and practice in office routine; and another course, called the "English Course," for those students whose elementary knowledge is not sufficiently sound to warrant their entry into the higher departments. This course comprises:—Arithmetic, penmanship, English grammar, reading, spelling, United States history, geography, and letter-writing.

I may best indicate the scope of the work of these institutions by quoting shortly from the prospectus of one of the soundest of these American colleges, as follows:—"This college is devoted to the special training of young people who intend to devote themselves to mercantile or allied pursuits. Its course of study is arranged with the aim to develop the business capacity of the pupil, and to impart a knowledge that will lay the foundation for a successful business career. The essential feature of the system is individual teaching."

The great feature of these colleges is, however, the actual business practice. After

having completed a certain amount of theoretical work, the student is advanced to the counting-house department, which is not a mere figure of speech, but an admirable and altogether realistic representation of a business house. Indeed, in the larger institutions one would find an entire floor of the college building fitted up, with here a counting-house, there a bank, with its different divisions, and in other parts of the hall, offices representing firms of various descriptions. The student then actually performs in turn the duties of salesman, shipping clerk, cashier, receiving clerk, bill clerk, stenographer, book-keeper, &c. In some places he actually carries on business with other cities by correspondence with students in similar colleges in, say, New York, Boston, Philadelphia, and Chicago. He orders or ships goods, draws drafts, makes and receives remittances, and, in fact, performs all the duties of a man of business. At the time of my visiting a college in Philadelphia, there was actually a "public auction" going on, the instructor being mounted on a rostrum and the students in various parts of the room bidding against each other as to the manner born, paying with dummy cheques, keeping practical accounts of the business and showing results. In another establishment in the same city I noted that from the first day of entry a student was set-up in business, a cash capital was given and deposit-slip made out. He went to the bank (an actuality) from time to time, presented his money and deposit-slip and went through the regular banking routine. At a subsequent period he occupied a position in the bank, either as receiving cashier or paying clerk.

In the Gem City Business College in the town of Quincy (Illinois), I saw a most elaborate and perfect system of practical business training. An immense hall was fitted up with four banks, each bearing its title plainly over the front representing the four sections of the country. There were, in addition, two wholesale houses, two commission houses, one railroad express and freight company, one insurance and land office, and so on. Every description of document used in a house of business is brought into use in this department. There were also clearing-houses, and, finally, an actual bank in the office of the college, where the actual deposits of students were received, and also occasionally of non-members of the school. In most of the colleges there was exhibited the market report for the day, just as it was received from the Board of Trade Department of the State.

There can be no doubt that this elaborate and exhaustive system is attended by very good results, and that the young people of both sexes who have gone through such a course intelligently, are fairly well qualified to take a place in any house of business, without requiring that coaching and supervision which the raw youth fresh from the public school invariably needs, and which it is generally nobody's business to supply. But, at the same time, it is highly probable that the completed student—or "graduate," as he is termed in America—has in reality no sound knowledge of any particular commercial subject, but rather a general and often hazy idea of office routine, and in this respect, it seems to me, the American method falls far short of the English. If I might be permitted to crystallise into one sentence my criticism of American business training methods, I should say there was much to gratify the eye and to make an attractive display, but the great outlay involved in all this ornamentation and lavish expenditure on mahogany, plate-glass, and gilding prevented the employment of a staff of teachers adequate to the purpose, and able to carry out what is so desirable, but what in America is found to be but a mere figure of speech, namely, strictly individual instruction.

The chief difference between American and English methods lies in the importance they attach to what is called "business practice," as against our system of specialised teaching in individual commercial subjects, such as shorthand, book-keeping, type-writing, French, German, and Spanish. My experience showed me that while there was something to learn, from an English point of view, in the American methods of training in office routine, the teaching of shorthand and other individual subjects was much inferior to that obtaining in England.

In the short time at my disposal it is impossible for me to give as exhaustive and clear an account of American methods as I should wish, but I trust I have indicated with sufficient plainness the lines on which American business training is conducted, and I must now pass on to consider for a few moments the methods of commercial education in England.

I will take as my type an institution which may well be said to represent commercial schools in Great Britain, inasmuch as it is not only the largest of the kind at the present time in any English-speaking country, but furthermore stands as the parent, the fountain and origin of them all.

Students entering these schools have as a rule the right to select the subjects, either singly or in groups, which they are to be taught. Thus, for instance, one may take shorthand, another shorthand and type-writing, a third these subjects plus book-keeping, a fourth may add one or two modern languages to this course of study, while a fifth may take one or two odd subjects, such for instance as arithmetic, penmanship, and Spanish, and so on. The range covered by these institutions is a very wide one, and comprises generally, shorthand, type-writing, book-keeping, office routine, arithmetic, penmanship, grammar and composition, French, German, Spanish, Italian, English to foreigners, and civil service preparation. From such a comprehensive bill of fare it cannot be a difficult matter for parents, guardians, or responsible students to choose items suitable to their requirements or their tastes. Each subject is taught in a separate department, and has its own special staff of tutors; indeed, where the patronage given to a subject is exceptionally large, it may be split up into many divisions, as is usually found to be the case in shorthand teaching. In the modern language sections "native" masters only are engaged in each.

One of the great advantages offered by these schools is the facility given to men of business and others to take instruction at almost any reasonable hour of the day or evening. For instance, teaching is going on from 10 a.m. to 9 p.m. daily, with short intervals at one and four, and as there are no long vacations, the only blank days being those generally regarded as public holidays, such as the Bank and other national holidays, it is conceivable that a student may take his lessons at any time suitable to himself. This is rendered the more easy by reason of the system of individual tuition, which obtains throughout. Each student is taught personally in each department, and is thus able to come and go entirely at pleasure, and without disturbing the studies of others present, or the continuity of his own. This admirable arrangement is no doubt accountable for the fact that so many business men take advantage of the facilities offered in the subjects, for instance, of shorthand, book-keeping, and modern languages.

It is scarcely possible, in the time at my disposal, to give anything like a clear idea of the fees charged at the English commercial schools. There is usually a separate fee for each subject based on the length of time taken by a student of average capacity to complete the

subject. For the fee of £20 (equal to the charge made by the American colleges for a year's instruction) the student can take up shorthand, book-keeping, business training, penmanship, arithmetic, and typing, and be guaranteed completion in them, without any time-limit whatever.

Perhaps the chief point of distinction between the American and English methods is the relative difference in the importance attached to the study of shorthand. In the States, shorthand is taught in a very perfunctory way, and as a proof of this, I may mention that while the principals of colleges there regard women as very much the inferior of men as teachers, the teaching of shorthand is, nevertheless, generally placed in feminine hands. In this country, on the other hand, shorthand is considered, and very rightly to my mind, as of paramount importance. It is one of the surest passports to employment which a young man or a young woman can possess, and while it is a great fallacy to depend on shorthand alone as a money-earning qualification, it does undoubtedly obtain recognition at the hands of thinking employers, and frequently gives one candidate a personal interview with the employer, while an otherwise equally efficient applicant is passed over on account of his want of acquaintance with this subject.

I spoke just now of the young woman seeking employment, and I am reminded of the immense part that shorthand, in conjunction with type-writing, has played in the opening-up of a field of remunerative occupation for young women. It is but a few years ago, comparatively, that the type-writer made its appearance in this country. The suitability of type-writing to women as an occupation was very readily recognised, and the influence which the advent of the type-writer has had, together with the twin art of shorthand, on the business life of this great city cannot be lightly estimated. So far, women have proved themselves somewhat superior to men in the use of this ingenious machine, and in regard to shorthand it may be said that although they were slow to catch up to their brothers in the manual dexterity, they are now surely and unmistakeably proving their right to be placed on an equality with their male competitors even in the matter of speed. Whether the sexes are equally suited to the work of a house of business is another question, and one which I do not propose to go into to-day. I may perhaps be allowed to say that although at first employers looked somewhat askance at the prospect of young women in the

office, the number of houses of business employing ladies as clerks, book-keepers, and so on, at the present time, is increasing enormously day by day. Ladies have shown an adaptability to office routine and an aptitude for commercial methods which have surprised their most hostile critics, and excepting only the few young girls who enter upon this work with no more serious idea than to earn a little pocket-money, there is no valid reason why women should not be considered the equal of men as clerks, book-keepers, or secretaries.

Great stress has been laid on the importance of a sound commercial knowledge of the French, German, and Spanish languages, all or any of them. I remember hearing the present Attorney-General enforcing this point most eloquently and convincingly, and there can be no doubt that the addition of one or more of these languages to the business equipment of a youth is an immense help, not only in the obtaining of suitable employment, but in enabling him or her to rise to higher and better positions. The Attorney-General, in the speech referred to, said:—"In order to carry on the commercial business of the world it is absolutely necessary that the knowledge of foreign languages should extend, and particularly necessary in a country of such predominating commercial importance as England." I think we can all heartily coincide in that opinion. We know how much and how often the young German is paraded before us as an admirable linguist. It is true enough that those who come over to this country pick up a working knowledge of our language with a facility which is little short of marvellous, but in this connection we must not lose sight of the assistance rendered to the youths of continental countries by the money which is spent by the various Governments in subsidising their technical schools and commercial colleges. In Great Britain it is left entirely to private enterprise, and, as I have pointed out, often in the teeth of opposition from quarters where we should have most right to look for encouragement. But much is being quietly done in England at the present day to fit the youth of this country to take his place in the battle of life on equal terms with his continental rival.

In the institution to which I am particularly referring the main object kept in sight is "practical training for commercial life," but, nevertheless, the advantages of a literary and conversational knowledge of French, German, &c., are by no means lost sight of. Each of the languages has a special department de-

voted to it for practice in conversation, and the student is thus enabled to get a stronger and more thorough grasp of the language than would be possible from book work alone.

One of the difficulties which has to be faced by the managers of these colleges, is the question of the separation of the sexes in the classrooms. In America no attempt at this is made, the general opinion being that as girls are being taught to qualify themselves for business houses, where they will be unavoidably thrown into contact with the opposite sex, it is just as well to let them associate in the business college. I am quite prepared to hear expressions of dissent from this opinion, and I may add that in this country some attempt, at any rate, is made at the separation of the sexes, especially where the numbers are very great and will warrant a separate staff for each. Because, of course, these are all proprietary establishments, not run on philanthropic lines, not subsidised by Government, or otherwise, and the working of the business on profitable lines has to be made a consideration. No doubt as time goes on, and more and more young women embark upon a business career, the need for any consideration of this aspect of the question will grow smaller still.

The question of the fitness of an intending student for a certain course of study is a most important one, and in the course of my American investigations, I directed special attention to the question of entrance examinations, of which I had heard a good deal before my visit. Several of the proprietors of the colleges spoke very loftily of the rigid entrance examination which they imposed upon all prospective pupils. Some gravely assured me that they rejected on an average fifty to seventy-five per cent. of the applicants on the ground of general unfitness. I was at first inclined to accept these statements as so much gospel truth, until I arrived at Brooklyn, where I had an interview with the principal of a very well-known and important business college. This gentleman was spoken of with remarkable unanimity in the highest terms of praise by the principals of colleges in almost every city I visited. While they frequently abused one another heartily, they agreed in regarding this gentleman as able, conscientious, of good business abilities, and one whose opinion would always be entitled to great respect. When I put the question of the entrance examinations to this gentleman, he replied with almost the suspicion of a wink, "You may take that as pure Yankee bluff.

Business colleges here are run for a profit, and their proprietors would no more reject an applicant, no matter what his mental attainments might be, than they would turn their backs on a fat political job." So much for American opinion on this subject. Frankly, I may say, that the practice in this country is to take all comers, and to advise those who are deficient in subjects they have not arranged to take up to remedy the defects without delay. It must not be forgotten that English commercial colleges have great influence in placing their efficient students in business, and in this way it is possible to bring pressure to bear on those who are lacking in business handwriting, for instance, to make good the deficiency. But in my experience, which extends now over some sixteen years, I have found that the student who presents himself or herself at these colleges is usually one whose early training has not been neglected, one who is very well qualified, generally speaking, for the career he or she is endeavouring to follow. Besides, the teaching of a subject like shorthand, for instance, necessarily involves abundant instruction in grammar, spelling, composition, punctuation, &c., and inevitably imparts an all-round knowledge of men and things which in itself is a liberal education. It widens the horizon of these young people in a very marked degree. Speaking of employment, I might add that the demand for capable stenographers, typists, book-keepers, foreign correspondents, &c., is very healthy, and the general experience for some years past in these colleges has been, that the difficulty is found rather in coping with the demand than in an over supply of applicants.

I cannot omit from such a paper as this my tribute of gratitude to such bodies as the Society of Arts, the London Chamber of Commerce, and kindred organisations, for the splendid impetus which they give to the thorough study of commercial subjects by the examinations they conduct from year to year. They have been the means, to my certain knowledge, of arousing enthusiasm in the breasts of thousands of young students, enabling them to reach a high degree of perfection in the subjects I have referred to, when without this excellent stimulus they might have been content with a respectable mediocrity.

The demand for commercial education is at the present day greater than it ever was. The institution I have been taking as my type receives annually something like 3,500 to 4,000 new students, and with such a patronage,

drawn, as I have already said, most largely from the best of the middle-class families in the country, the position it occupies in the educational world is a most important, as well as a most responsible one. That it performs its work efficiently is best evidenced, I think, by the fact that more than half of its new business yearly is the direct result of the recommendation of former students. To those interested in the future welfare of English young men and young women, it is indeed a gratifying thing to witness the energy which they throw into their studies, many of them attending in the evening after a long day's hard work, with the object of improving themselves, and still further fitting themselves for the work they have undertaken.

I will conclude with the hope that the paper I have had the honour of putting before you will cause you to agree with me in thinking that commercial education in this country is a real live force, tending to the general good, and entitled to the respect, if not to the support, of all who have at heart the preservation of our greatness as a commercial nation.

Sir OWEN TUDOR BURNE said he should like to compliment M. Jacques Siegfried upon his paper, and he was sure others would agree with him that it was one of the most valuable contributions to the Congress. He was surprised to find that the higher secondary technical education in France was so infinitely superior to that in England. With regard to the paper read by Mr. de Bear, he wished to bear his testimony to the excellence of the Metropolitan school which was mentioned in the paper. He had the honour of inspecting that school two years ago, preparatory to giving away the annual prizes, and he thought it one of the best institutions in England, and well worthy of a visit from anyone interested in higher secondary commercial education.

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THURSDAY AFTERNOON, JUNE 17.

SECTION B.

Sir OWEN ROBERTS, D.C.L., F.S.A., in the chair.

SYSTEMATIC COMMERCIAL  
EDUCATION.

By T. A. ORGAN, B.A., L.C.C.

Catch-words and catch-phrases play a great part in English life, and in recent years the phrase, "the ladder from the gutter to the university" has had a very great influence in

educational polity. It expresses what has been the dominating idea in the minds of expert educationalists, and it has been the phrase most often used by the politician who desires to obtain cheap applause for the zeal of his party in promoting popular education. In many cases it has led to the useless frittering away of large sums of public money. I refer to the part of the money expended in scholarships, the holding of which has neither benefited the scholar, nor led to any useful work for the community.

In the majority of cases it is a cruel kindness to tempt a poor lad by means of a scholarship to seek to attain a university degree. While so doing he is actually disqualifying himself for work which otherwise he might do well, and as an adult he finds himself the possessor of qualifications which are useless, either because there is no demand for the services which he is capable of rendering, or if there is a demand, because it is supplied by men who have more influential friends.

Theorists will tell me that these views are utilitarian and non-educational. This is neither the time nor the place to deal with this assertion, beyond saying that I do not admit that a liberal education cannot be given on utilitarian lines.

There is an idea underlying the "gutter to the university" phrase which its originators had well in mind, but it has become lost in the too literal interpretation of the words. Commonly the "gutter" is now understood to be the elementary school, and the "university" one of the corporations with degree-granting powers. If the aim of those who so glibly use the words is to afford opportunities innumerable to the lads of the public elementary schools to enter as students at the universities, then in the interests of these lads, I enter a respectful protest. If, however, the words are taken to mean the provision for all of equal educational opportunities to obtain a "preparation for complete living," one can accept the phrase as fully describing the true educational ideal. As now commonly interpreted, it is harmful to the individual, and prejudicial to our national interests.

"A PREPARATION FOR COMPLETE LIVING."

At a comparatively recent date, both theoretically and practically the man of education was prepared to live by learning sufficient Latin and Greek to enable him to state at a later date that he had forgotten it, and even now it is only *theoretically* that the halo of sanctity



which surrounded the ancient classics has disappeared.

I am aware that in many of our secondary schools there is a "modern side," but, to use the words of the Schools Enquiry Commission :—

"The modern side of a classical school usually degenerates into a refuge for boys without ambition."

What was true at the date when this Commission reported is largely true now, although there are many notable exceptions. How can it be otherwise, when nearly all the scholarships and prizes of the secondary schools are given to those lads who pass brilliant examinations in subjects which fit them for competing at a later date for university scholarships, the gaining of which will bring fame and new pupils to the school. The masters are usually men who have distinguished themselves at their respective universities, and naturally they are inclined to encourage their best lads to work along similar lines. The preparation of two or three brilliant lads annually for the university is much more congenial work than drilling the average boy in subjects which will be of use in practical life. That changes are being effected in the curricula of old established schools is true; but these changes are more apparent than real, and will be so long as the only appreciable test of the efficiency of the ordinary secondary schools is the university local examinations. One looks in vain for a school prospectus which states that an old boy has distinguished himself and brought honours to his school by becoming the manager of a drapery establishment, the chief clerk of a bank, or the chief engineer on board a liner. On the other hand, reams of paper are devoted to advertising the university scholarships won by lads who have been forced in the educational hot-house into brilliant, yet feeble plants, which will die fruitless when placed out in the world.

#### THE TRUE FUNCTION OF SECONDARY EDUCATION.

As an abstract proposition it will not be denied that the true function of secondary education (as well as all other education) is "preparation for living," nor that this "preparation" must vary with the mode of "living" for which the pupil is intended. It is only recently that systematic efforts have been made to vary the preparation, but sporadic efforts have been in existence for a long period. These have usually ended in the disappointment of the originators and in disaster to the pupils.

No thoughtful person decries the literary side of education, but when that side is exclusive and leaves no room for scientific and technical training it is not effective for the good of the commonweal. This was well stated by the Secondary Education Commission, who, in referring to the three branches of secondary education—literary, scientific, and technical—said :—

"All have, in our view, a claim to be considered in the course of studies of every secondary school, and the last of the three will thrive all the better if the two former receive their fitting meed of recognition. Technical education must be considered, not as the rival of a literary education but as a specialisation of it."

Before that Commission sat, the technical industrial side of education had been vastly strengthened and improved, but I submit that improvement in the technical commercial side had not kept pace with modern requirements and ideas.

"One-sidedness" was the charge which was formerly made against our system of secondary education. It was said to be too literary.

"Two-sidedness" is the burden of my complaint in that the literary and industrial sides are excluding the commercial. I know the school difficulty which arises out of the already over-burdened curriculum, but I maintain that the school training of the child above 14 years of age should be along lines which will prepare him for the life which he is intended to live, and not along a line or a number of lines which in his particular case lead nowhere.

#### SYSTEMATIC COMMERCIAL EDUCATION — A NECESSITY.

I submit that to-day the educational necessity is a systematic course of commercial instruction. I use the term "systematic" as its omission would be met by the assertion that the opportunities for commercial instruction exist in the form of evening classes, &c. These I regard as worse than mere stop-gaps, for they have lulled us into security, as on these worthy, but ineffectual attempts to supply a want, we have relied to the national loss.

It is not necessary to recall to your minds the skeleton which appeared at the commercial feast of last year in the shape of a book entitled "Made in Germany." The statistics given in that book, and the deductions therefrom, have been the subject of much controversy, but its author and all his critics agree that the lengthy commercial strides which Germany has made are undoubtedly due to her superior commercial education. A pessimistic attitude and a belief

that we are beaten in the race for commercial supremacy are absurd. On the other hand, it is unwise to adopt the ostrich procedure, and to blind ourselves to the fact that other nations are pressing hard upon our heels in the commercial race.

The recent official report made to the Duke of Devonshire contains these remarkable words :—

“And while it is possible that the aggregate value of the foreign commerce of Germany in comparison to that of Great Britain has been over-estimated, there can be no doubt that in certain industries our supremacy is seriously challenged. Germany is making enormous strides.”

This is the testimony of Mr. Monaghan, the American Consul :—

“That if his country and ours did not meet Germany more thoroughly and more practically in the school, each would in the course of a few years be compelled to yield to Germany the first place in all the higher and more profitable fields for manufacture and commerce.”

Going from Germany, we find in the journal of the Board of Trade, issued last month, a foreign report which contains the following :—

“Entire countries, especially in the new world, which at one time might have been considered the ‘preserves’ of the English merchant, are now overrun by the agents and travellers of the United States.”

A perusal of the reports of our own Consuls has convinced me that there is cause for grave alarm. The foreign workman cannot produce a better and cheaper article than his English fellow, but the means taken by English houses to place that article on the market are of a character greatly inferior to the means employed by foreign houses.

Let me quote a concrete instance as given by our Egyptian consul. The incident occurred within the last few months. A foreign Government asked for tenders for four portable engines, 12 horse-power *effective*, with a guaranteed coal consumption per horse-power. Many English tenders were received for engines, 12 horse-power *nominal*, equivalent to 30 horse-power *effective*; the price of course being higher than that of those who tendered an *effective* horse-power. This mistake lost the English firms the contract, and the work placed in an Austrian house.

And another, which is within my personal knowledge. An English firm tendered for a large quantity of machinery required for a Turkish manufacturer. The terms of the tender were in the English language and currency.

Other tenders were received from German and Austrian firms, these being in Turkish language and currency. The natural result followed. The tender of the English firm was not even examined, but an investigation after the contract was made showed that the English price was the lowest, and that the work had gone to an Austrian house because the English terms were quoted in our comparatively unknown and complicated currency, and in our own language.

In both these cases, a loss accrued to English trade, a loss arising solely out of want of skill in “getting the article on the market.”

#### WHERE WE FAIL.

It is agreed on all hands that in the matter of technical industrial education we are making up leeway, and on the other hand there is quite as decided a consensus of opinion that in technical commercial education we are drifting to leeward as helplessly as ever. Let me give a few of the many facts upon which I base this statement.

The commercial travellers who visited Palestine in 1896 were distributed among the nations as follows :—English, 4 ; Germans, 29 ; Austrians, 18 ; French, 13 ; Swiss, 3 ; Italians, 2 ; Belgian, 1. These are exact figures as given by our own representative, and other foreign reports tell the same tale but the figures are not given. It is agreed that although advertisement tends to promote trade, it can never have the same effect as travelling agents thoroughly acquainted with the views and wishes of their principals and possessing a knowledge of the language, customs and currency of the land in which trade is sought.

As to advertising, we are far behind our rivals. Our Spanish representative says that the English catalogues are useless and absurd, showing not only crass ignorance of the language but also of the technical details of various trades, and that the larger number of them quote prices in the English currency. Contrast this with the “push” of the German. He takes care to catalogue and describe his goods in English when advertising in our own or any English speaking country. It is only within the last few weeks that Mr. F. H. Burford, our Victorian representative, reported that our bicycle trade in that colony was suffering severely owing to the inferior style of the catalogues which are being circulated. A number of these catalogues were submitted to good judges, and their unanimous award was :—United States, best ; Germany, second ; British, worst.

In the foreign reports, complaint is rife as to the ignorance of the English merchant respecting foreign dues and customs. A glaring instance occurred only recently. On a certain textile fabric the import duty is 5s. 4d. per kilo. if delivered untaped—if taped, three times as much. Our Consul in that country reports that ignorance or negligence of this fact has done much to lose for England the trade in that article. The foreign houses are most careful to make themselves thoroughly acquainted with the various dues and customs, and in many cases they quote prices which cover these and represent the cost of the article delivered at the customer's own door. One can well understand the great inducement offered to the retailer by the firm which quotes "duty free" as compared with the one whose quotation is only part of the price, the other part not being ascertained without a large amount of trouble.

With more of these instances one cannot deal in detail, but it may be taken as a common-place in trade reports—not only by Englishmen but by foreigners—that the British traders and his representatives are wanting in resource and that they are not well equipped with the arms of their profession. For foreign trade especially, the English manufacturer has to rely largely on the foreign traveller, who learns his employers' trade secrets and his trade weaknesses and uses them as he pleases.

#### ONE OF THE CAUSES OF THIS FAILURE.

In all but the elementary branches of English education we have worked along old lines and travelled in the old ruts. The bells of our university leaders jingle, and with pack-horse constancy we have blindly followed, not caring whither. The results are disastrous, and I cannot do better than call, as witnesses to uphold my statement, the London Chamber of Commerce, who say:—

"Business men have been galled by the constant proofs exhibited to them of youths seeking employment ill-equipped for their calling, ignorant of the elements of commercial life, and lacking the essentials of utility, so long as they as employers confined their attention to the engagement of youths trained in British schools. These same employers have been equally concerned at learning that it was not possible to find in the labour market a British youth—or, if possible, then but rarely, and as an exception proving the rule—capable of competing with Continental youths who have had the advantage of 'practical' education, whose tuition has been guided by the career they had in

prospect, and who to the commercial man of to-day are valuable. The employment of foreigners has hitherto been compulsory in English business houses."

That there is a lack in English schools of proper training for commercial life, and that as yet no successful systematic effort has been made to supply the gap in our system, is evidenced by the statistics given by the Chamber of Commerce of the examinations which they have conducted. Although 200 London firms have undertaken to give preference, in selecting assistants, to lads who possess the Chamber of Commerce certificate, yet after the scheme has been in existence for over six years, last year only 49 candidates presented themselves for examination, 40 sitting at London, 6 at Aberdeen, and 3 at Portsmouth. In 1890, 65 London candidates were examined; in 1891, 86 candidates; in 1892, 79 candidates; in 1893, 76 candidates. When it is remembered that in London alone there are 105,000 business men and women who style themselves clerks, the signal failure of the Chamber to induce schools to train on commercial lines is apparent, especially when we see that in 1896 the candidates were half the number of those in 1891.

That the supply of English commercial assistants is less than the demand is patent, for the report of the Chamber states:—

"The most eloquent fact that the Chamber can adduce as an encouragement to proceed with its work is that no holder of the junior certificate has yet endeavoured unsuccessfully to obtain a situation through the Chamber formerly, or latterly through its employment department."

"Commercial education" figures largely in the prospectus of many schools, but only a very few send up their lads for the Chamber of Commerce examinations, in spite of the manifest advantages accruing to a successful examinee.

#### FOREIGN PROGRESS V. ENGLISH CONSERVATISM.

Alertly progressive in commercial education are our foreign competitors, while we are blindly traditional. Our greatest competitor is Germany, and at the present moment she has 200 schools and institutions devoted solely to commercial training; these have 24,000 pupils, 19,000 being elementary and 5,000 being intermediate. France has 9,000 pupils in her commercial schools, and Italy has 8,500.

*Russian Progress.*—The latest information from Russia is of an instructive character. Her first commercial school was established in

Moscow in 1772, and its definite aim is shown by the words of the statute under which it works:—

"To give to its pupils a general education, and to prepare them for commerce, and for taking the post of book-keepers, controllers, and chief clerks to manufacturers."

In 1885, Russia had 36 of such schools, but in 1894 it was found that the number had been reduced to 25. The Russian government, with a foresight which is lacking here, immediately placed the matter in the hands of its most powerful government department, the Ministry of Finance. This department is setting up new schools in which the pupils are to receive the necessary training, for service in the capacity of clerks and small traders, and in industrial banking and insurance methods. "One-class" schools are being established for those pupils whose lack of means prevent them from remaining for a long course; and "three-class" schools for the children of more well-to-do people; and finally, employers' classes for those who can attend in the day as well as in the evening for a long course. The programme of each school is adapted by the Ministry to the local needs.

*Austrian Progress.*—Mr. J. Goldschmidt, the United States Consul-General in Vienna, gives details with reference to the work carried on in that city. A full description is given in the *Board of Trade Journal* for August, 1892. He says:

"In these special commercial schools, pupils are actively brought into contact with practical life; they regularly visit the public collections of commercial and industrial art, industrial establishments and make 'instruction journeys' to the great centres of commerce under the guidance of the professors. Despite a high fee—150 florins annually—the number of pupils has steadily increased, as it was found that those who had passed the academy could command their price in the market."

The instruction does not end in and around Vienna, for many of the students have been, and are now, in England, in order that

"as opportunity offers, they may return to their native state and put their newly acquired knowledge to use in the marts of the world."

At the risk of being tedious, I quote two other extracts from this valuable monograph:—

"1. England is thus (by training these young Austrians) raising up for herself in the near future a new, most intelligent, capable and determined competitor."

"For some years past the director of this special school has been applied to by foreign governments to

give complete practical explanation of its organisation and system, while banking and commercial houses in London and elsewhere, requiring specially trained and capable young men, have been applied to and supplied by him from the students under his charge."

*German Progress.*—A correspondent of the *Monde Economique* says:—

"The Germans have shown themselves during the last few years to be on the way to become past masters in commercial matters. Their energy, patience, activity, and spirit of enterprise are remarkable, and at the pace they are going they will soon succeed in obtaining the commercial supremacy on the chief markets of the world."

The correspondent then deals with the means employed by the Germans with a view to developing and encouraging the native qualities of their race. He attributes much of their successes to their commercial education, and he especially calls attention to a society founded in Hamburg in 1858, with the object of procuring situations for young men desirous of entering trade, in which they may have facilities for learning the usages of international commerce. At the time of writing, the correspondent states that the society, consisted of 34,000 members, and that it had 170 branches. Such a society formed in England would be a valuable adjunct to any system of commercial education which may be hereafter established. To pile up instances would avail little, but it would be easy to produce evidence of a most conclusive character, showing that the countries which are increasing their trade are also those which are giving the most attention to systematic commercial education.

"COMPETITION BECOMING MORE ACUTE."

"Indeed, there are indications that in the immediate future our own countrymen will have to encounter a competition far more acute than anything they have had yet to grapple with."

So say Sir Philip Magnus and his colleagues in their report of last year, a report based on personal observation of the methods of trade adopted in the countries which they visited. This competition we are preparing to meet on the technical industrial side of our education, but on the technical commercial side we have done nothing worthy of a name.

There are encouraging signs, for the Technical Education Board for London is alive to the necessity for immediate action. In their last report to the County Council, referring to education, they say:—

"One of the subjects constantly kept in view by the Board has been the importance of commercial educa-

tion; there is no direction in which better technical instruction is likely to be more effective in promoting the industry and well-being of London."

A few weeks since the Board appointed a special committee to bring up plans for effective work in this direction, and if London lead well in this matter the provinces will assuredly follow. At present in the higher branches of commercial life the foreigner holds the field, but there is no reason why he should continue to do so, provided we supply systematic training for our native talent.

In his "Expansion of England" when referring to our war with France in the two first decades of the eighteenth century, Seeley says :

"England and France stood in direct competition for a prize of incalculable value. The prize was the control of the markets of the world."

The ethics of a war, based on such a motive, I am not prepared to defend, but the value of the prize for which both nations spent so much blood and treasure is beyond question. The commercial war is no less keen now, although the fighting men are clothed in fustian and broadcloth and the field of battle is the manufactory and the counting house.

Energy, brains and physique we have, but in commercial education our methods are antiquated, our guides are not sympathetic, and we must decline to follow the latter and modernize the former if England is to remain in the forefront of the commercial world.

## THE TEACHING OF ECONOMICS.

By W. A. S. HEWINS, M.A.,

Pembroke College, Oxford; Director of the London School of Economics; and Tooke Professor of Economic Science and Statistics at King's College, London.

In a paper which I had the honour to read before the Society of Arts last December, I pointed out that the provision of economic teaching in England was incomplete and unsatisfactory, and I expressed the hope that economic study would be promoted by the organisation of higher commercial education. I assumed that a scientific training in economics was an indispensable element in any well considered scheme of commercial education. Economists are, I think, rather more ready to recognise the advantage to their science of direct contact with the business world than the business man to admit the obligations industry and commerce owe to the economists, and, although even a slight

acquaintance with the history of the 19th century would suffice to show how many important national movements have been inspired by the teaching of economic writers, it is not obvious that the working efficiency of the average clerk is increased by an elementary acquaintance with the principles of economics. I will, therefore, endeavour to state, as precisely as I can, the grounds for what some people will think the extravagant claim I have made on behalf of economic training.

One or two examples will, perhaps, make the matter clearer. None, I presume, would hesitate to admit the necessity of scientific training in the insurance world. Here we have a vast and complicated system, involving great sums of money and the happiness of many thousands, resting upon a basis of what is, after all, abstract reasoning. It is seen that the phenomena of life and death, of accident and disease, obey certain general laws which can be stated with mathematical precision, when we have to deal with large numbers of human beings, and we praise or blame different societies by applying to them purely scientific tests. No educated man would dream of dissociating the scientific study of vital statistics from the business of insurance. It so happens that, for various reasons, the actuarial department of human affairs has been reduced to "law and order" to a much greater extent than some other departments. But the existence of scientific principles, not indeed of universal validity, but relative to the existing structure and organisation of society, is equally certain in connection with other subjects. It is difficult to see how the most practical problems of currency, banking, international trade, or factory legislation, could be intelligently stated without reference, explicit or assumed, to the underlying principles of economics. We have lately seen a Royal Commission referring to the teaching of the economists to elucidate some of the most practical problems of national finance, and a very high authority has informed me that, in his opinion, one of the main difficulties in unravelling the question of the incidence of local taxation is the incomplete treatment given to that subject by economic writers. The experience of the London School of Economics, where, during the last two years, we have had numerous courses of lectures on higher commercial subjects, shows that unless such courses are supplemented by a carefully arranged system of classes, at which the students can obtain systematic

training in economics, it is impossible to make much progress.

So long as we think of commercial education as some general course of study appropriate to any and every business man or clerk, it may be possible to discount the value of economic training. But directly we face the real problem, viz., the provision of suitable courses of study for groups of men and women engaged in certain well defined employments, very brief experience will show that the students must be well grounded in economics, and the question is reduced to the determination of the nature and extent of the teaching.

I believe the opinion is still very widespread that by economics we mean a neatly rounded set of general propositions which can be comprised in a small crown octavo text-book, and learnt like the multiplication table. So far as that is the case, it is easy to understand the objections to the subject felt by the great manufacturer on the one hand, and the artisan on the other. But, as Jevons pointed out, it is important to realise that economics is not one science but several. It includes, at any rate, in the English acceptance of the term, the pure theory, which can be carried to a very high degree of abstraction, the analysis of the actual structure of the modern world of business, the more or less inductive work of the historian and the statistician, the art of finance and administration, and many other branches. No economist, who devotes his whole life to the subject, can hope to become well acquainted with all its different branches, and it is at once obvious that in insisting upon economic training as an indispensable element in commercial education, it is necessary to carefully select the portions of the subject to be included in the curriculum. I suggest that the course should include (i) what we may call *Descriptive Economics*, which should be a scientific account of the more general features of the modern world of industry and commerce; (ii) *Theoretical Economics*, which should include a careful and systematic training in the meaning and use of economic terms, and the leading principles of the science; (iii) *Elementary Statistics*, a subject, I confess, exceedingly difficult to teach, but which should aim, not at turning out expert statisticians, but enabling the student to appreciate and use intelligently, for ordinary purposes of reference, the materials collected and tabulated in published returns. These three branches I regard as essential. Round these classes may be usefully grouped

special courses of lectures on such subjects as currency and banking, commercial policy and the like. In their absence, either the special courses will not be followed by the best results attainable, or, to make them successful, each lecturer must waste time by giving the necessary explanations himself.

Dr. PYFFEROEN, speaking in French, said Mr. Hewins had strongly praised and advocated the teaching of political economy, which he considered an absolute necessity in a school which proposed to give a commercial education. He (Dr. Pyfferoen) completely agreed with him, but he would like to point out that political and industrial economy already formed part of the curriculum of all the Belgian commercial and technical schools, but were naturally of a kind adapted to those who wished to enter trades or professions and of a more elementary character than the teaching of that science in the universities. Mr. Hewins had further seemed to be of the opinion that the teaching of foreign languages was without importance, from the point of view of commercial education. On that point, he thought it was as well to distinguish between the different degrees of education. Mr. Hewins had chiefly occupied himself with the question of superior education—naturally enough, inasmuch as he was the founder and director of the London School of Economics. But, in the lower and middle degree, the teaching of foreign languages, together with a knowledge of accounts, book-keeping, &c., were the principal subjects dealt with, and of the first importance. In Belgium the urgent necessity of developing commercial education was becoming more and more appreciated, and he thought no one would dispute that. Speaking of the lower middle class, it was necessary that they should be taught a knowledge of foreign languages, in view of the growing facilities of communication, and their increasing international relations.

M. JACQUEMART assured Mr. Hewins that in France political economy was not a neglected subject. The character of the teaching, and the extent of the study, of course, depended upon the status of the school, and was appropriate to it, but of all the schools of commerce he did not know one in which the teaching of political economy did not hold an important place. The science of political economy was the life of commerce—almost of the people—and so was taught to all those who entered their commercial schools, according to the importance of the school, and the degree of education which the pupils went there to receive.

Mr. G. N. HOOPER said that it was only on the previous day that the Council of the London Chamber of Commerce held a meeting, and had deputed him to say a few words to express the sympathy of the Chamber with their efforts. He would first like to thank the

foreign visitors who had honoured them by attending the Congress for the kind reception given to the Royal Commissioners in their respective countries, and for the information which had been given about the systems of technical education pursued. He trusted their visit to London would be agreeable, and mutually profitable. The Chamber also rejoiced in the very great interest which was now being taken in the work they had been engaged in for the last twelve years. They had many difficulties to overcome, and progress had been slow, but it was now bearing fruit. They had received assistance not only from the head-masters of the great public schools of London and the provinces, but from the Universities of Oxford and Cambridge, from which they had expected to find a prejudice in favour of the older system of education, which, notwithstanding all that had been said, had produced a large number of very able men, who had greatly contributed to make England what she was. But on the part of the universities they found the greatest readiness to fall in with the views placed before them in reference to the education of those to be trained for commercial life. The Chamber also rejoiced in the higher position accorded to commercial men, compared with what it was many years ago, and they could not help thinking that the more highly and suitably commercial men were educated, the more capable would they be to conduct their own commercial affairs, but also the affairs of the country, to the advantage of both. In the course of the discussions, deliberations, and conferences that had taken place with regard to higher commercial education, the Chamber had sent a resolution, adopted by a unanimous vote, to the Education Department expressing the opinion that "in any new teaching university for London, the organisation should embrace all higher culture," and, as illustrations mentioned art in all its branches, agriculture, national defence, the organisation and equipment of armies and navies, naval architecture, questions of transport, such as the construction and equipment of railways, docks, harbours, and so on. They acknowledged with pleasure that they had received from the School of Economics, in whose house they were at that moment assembled, considerable assistance in their endeavour to improve the higher education of commercial men. During the last two years courses of lectures had been delivered in their Council-room in order to identify the Chamber with the teaching of commercial history, commercial law, commercial geography, economics, besides lectures on special branches of commerce. They had also paid increased attention to the teaching of foreign languages, and urged that such teaching should not be confined to French and German, but should include Spanish, Portuguese, and Italian. There would be difficulties at first, but they might be overcome by the great public schools taking different languages, and so covering the ground. He thought they would see that the London Chamber

of Commerce was taking its part in educational progress in no half-hearted manner.

M. JACQUES SIEGFRIED said that he desired to thank the London Chamber of Commerce, in the name of the foreign delegates, for the kind words which had just been spoken to them by one of its members. Their presence at that Congress was the best proof of their conviction that they thought international congresses a good thing. He desired to profit by the presence of a member of the London Chamber of Commerce by telling them that in his opinion the best way to promote technical education, and especially commercial education, in England, would be for the Chamber of Commerce to take the lead, because one thing which astonished them with England was the diversity of the different bodies who had charge of the general education system. Its diversity might have advantages in some respects, but undoubtedly too it had its disadvantages. There were three classes of commercial schools—the elementary, the secondary, and the higher, and if the London Chamber of Commerce would take the lead by establishing one school of each grade they would do a great service to their country.

Professor G. ARMITAGE SMITH desired to contribute a few words of experience, rather than to express any criticism upon what had been said. His claim to speak on the subject of commercial education was that he had been engaged in the teaching of political economy in one of the institutions of London—the Birkbeck Institution, in whose curriculum that subject held an important place—for the last 20 years, and also at the City of London College for a shorter period. One thing had struck him as being very remarkable, and that was the number of young German students who attended these classes; after working in an office all day they did not fail to avail themselves of the opportunity of studying economics, and other subjects bearing upon the theory of business, and that fact gave him the impression that in Germany they paid greater attention to commercial education than we did here. He was pleased to think that commercial education and the economic study of commerce were beginning to receive greater encouragement. He had noticed in the discussion in the other Section that when gentlemen spoke of technical education they evidently limited their view to the consideration of arts and crafts—that is to say, to the production of wealth. In so doing they overlooked a very important fact: they might produce wealth, but find great difficulty in distributing it. There were many competent inventors and producers who were unable to secure the best market for a very excellent article. The distribution of wealth was as much a matter of science as its production. One need not be alarmed at the statements made in a recent book contrasting our trade with that of Germany. A very little knowledge of economics would show that many of the statistics contained

in that book were very misleading. But some of its conclusions were distinctly correct, and one was that the Germans were studying the theory of commerce in all its aspects, while we rather held to the old-fashioned belief that trade would go where it had been accustomed to go. The world, however, was becoming one large competitive area, and we must play our part in it if we wished to maintain our pre-eminence. And, indeed, the progress of the whole world would be advanced thereby, for it was absurd to suppose that the scientific progress of one country was detrimental to others. He looked with great satisfaction upon an assembly of this kind, and he hoped that other County Councils would follow the lead of the London County Council in their efforts to promote commercial education.

### L'ENSEIGNEMENT DES LANGUES VIVANTES.

PAR L. SUTTLE, M.A.

Licencié ès lettres.

Personne ne peut nier que les enfants de quatre ou cinq ans peuvent parler facilement leur langue maternelle avec une bonne prononciation. Ce fait m'a donné à réfléchir, et fort de 30 années de pratique continue du professorat je me suis appliqué à faire une grammaire complète de la langue anglaise,\* basée sur le principe non-seulement de faire parler mes élèves avec la même facilité que parlent les jeunes enfants leur langue maternelle, mais aussi de lire livres, lettres, journaux, etc., et d'écrire correctement.

D'après la méthode de ce livre, la leçon se donne de la manière suivante: Dès l'ouverture de la classe, chaque élève remet au professeur la feuille sur laquelle se trouve le devoir donné, soit la version de la p. 14. Après avoir posé quelques questions sur les mots de la leçon précédente, le professeur lit distinctement la première phrase: le premier élève interrogé doit lire la même phrase en imitant la prononciation nette du professeur; puis il doit, aidé par le professeur, en faire une question en anglais à l'élève, qui, aidé par le professeur, doit répondre en anglais. Le professeur, après avoir posé quelques questions sur les mots de la première leçon au second élève, lit distinctement la seconde phrase, que le second élève doit répéter; et, aidé par le professeur, il en fait à son tour une question au troisième élève qui doit répondre toujours en anglais. On continue de la même manière jusqu'à ce que chaque élève de la classe ait récité sa leçon, ait lu et parlé anglais, le pro-

fesseur donnant la note à chaque élève en passant de l'un à l'autre. Finalement, le verbe est conjugué par tous les élèves: le premier élève dit la première personne sous les quatre formes "I have, I have not, have I, have I not;" le second élève dit immédiatement la seconde personne "thou hast, thou hast not, hast thou, hast thou not;" le troisième élève passe à la troisième personne, et ainsi de suite pour tous les temps. Le thème se fait de la même manière que la version. La classe se composât-elle d'une cinquantaine d'élèves, un professeur expérimenté et aidé par une bonne discipline peut, de la sorte, donner facilement sa leçon dans une heure. Quand les élèves auront fini la 22<sup>e</sup> leçon et qu'ils pourront conjuguer couramment les verbes sur les quatre formes, affirmatif, négative, interrogative et interrogative négative, le professeur exercera les élèves dans l'emploi des temps primitifs, et les fera parler en s'adressant les uns aux autres de la manière suivante: le premier élève dira au deuxième: "Parle-t-il à son ami? Parla-t-il à son ami hier? et a-t-il parlé à son ami aujourd'hui." L'élève ainsi questionné répondra en anglais: "Oui, il parle à son ami, il parla à son ami hier, et il a parlé à son ami aujourd'hui." "Does he speak to his friend? Did he speak to his friend yesterday, and has he spoken to his friend to-day? Yes, he speaks to his friend, he spoke to his friend yesterday, and he has spoken to his friend to-day."

Avec des verbes différents, le deuxième élève parlera au troisième, le troisième au quatrième, etc. A chaque leçon, ou, si le temps fait défaut, toutes les deux leçons, la version qui vient d'être corrigée par le professeur doit être dictée par lui aux élèves qui à leur tour, redisent les phrases, et prennent insensiblement l'habitude d'orthographier correctement tout en formant leurs oreilles. Quand les élèves auront appris tous les verbes irréguliers le professeur fera repasser de la manière indiquée les verbes, pages 151 à 158, sous le titre, "Table des Verbes exigeant des Prépositions particulières," et autant que possible "Les Locutions qu'on ne peut soumettre à des règles," pages 357 à 378. A force de répéter dans la classe, de faire passer, pour ainsi dire, d'un élève à un autre ces locutions, la différence si profonde entre les formes de l'expression anglaise et française finit par devenir familière; l'esprit s'y habitue et la difficulté disparaît. Par exemple, si "j'aurais dû aller" veut dire, "I ought to have gone," "tu aurais dû aller, il aurait dû aller, nous aurions dû aller, vous auriez dû aller, ils auraient dû aller, veulent dire également," "thou oughtest to have

\* "Grammaire Complète de la Langue Anglaise," par L. Suttle, M.A.



gone, he ought to have gone, we ought to have gone, you ought to have gone, they ought to have gone" (page 93). Toutes ces locutions sont susceptibles de tournures semblables. La leçon se donnant de la manière indiquée, les élèves ne peuvent s'empêcher, même s'ils ont négligé d'étudier les mots et d'écrire l'exercice, d'apprendre à parler anglais. De même qu'un enfant de quatre ans qui a entendu journellement le colloque de ses parents ne peut s'empêcher de parler sa langue maternelle, de même un élève obligé constamment de faire des questions et de répondre à celles du maître ne pourra s'empêcher de parler anglais ; et si, de plus, il écrit et étudie avec soin tous les exercices de ce livre, non-seulement il parlera, mais il écrira correctement l'anglais.

Dans une langue, il y a toujours des mots faciles à dire, à écrire et des mots techniques difficiles à dire, à écrire, que les élèves oublient le plus souvent, et qu'ils écorchent par conséquent. Ces thèmes et ces versions se composent (à l'opposé de toutes les autres grammaires) principalement de ces mots techniques, etc., très usités. L'élève peut, même sans professeur, apprendre les autres mots. Les racines grecques et latines d'où dérivent tant de mots anglais et français, placées en regard de ces mots, serviront aux élèves qui n'ont pas appris le latin et le grec.

Quand l'élève aura bien étudié ces 107 leçons et la prosodie, il n'a qu'à acheter les livres des meilleurs auteurs, et il peut les lire, les comprendre, et il peut faire des vers. Bien que ce livre soit une espèce d'analyse des phrases dont ce compose la langue anglaise, on doit se servir des versions pour la lecture anglaise. Après avoir fini la lecture des versions, où toute difficulté est expliquée, on peut lire n'importe quel auteur, et l'élève trouvera comme il a bien fait de finir tout d'abord la lecture de ces 107 versions et l'étude de tout ce qui se trouve dans ce livre, lequel lui servira de clef pour expliquer tous les auteurs.

Mr. HOWARD SWAN said it was hardly necessary in these days to suggest that such methods—a modification, he thought, upon some of the old methods—should be inculcated, when there was a widespread feeling now for the application of scientific methods, in which the true principles of psychology should have their place, to the teaching of modern languages. It was absolutely wrong to teach words that had no meaning behind them.

Mr. SUTTLE said that it was necessary for everybody to learn at some time of their lives "I have" or "I have not."

Mr. SWAN—Yes, but they should state what they have : and this statement should be a true one, and not false as usual in the lesson books. Language was a question of the expression of thought, and they should endeavour to arrange the thoughts of the students before teaching a language. Mr. Swan pointed out that it was often more imagination and not more technical knowledge that was required ; and gave an instance of carelessness and want of thought on the part of English manufacturers and merchants by stating that a large contract was lost to an English firm, tendering for some work in Turkey, by the fact that a German firm sent its tender in the Turkish language and gave its price in Turkish currency, whilst the English firm, which could easily have had the tender translated, tendered in English, and when the tender was afterwards translated and compared it was found that the English one was much more advantageous to the customer.

Dr. R. P. SCOTT said he felt well rewarded for coming to that Congress if only from having heard the excellent suggestion made by M. Siegfried as to the proper educational function of the London Chamber of Commerce in this country. He, along with Mr. Hooper, was a member of the educational committee of that body, and he could not help feeling, as he had said at its meeting, that the Chamber had not at all risen to its opportunities and the future which lay before it. It seemed to limit its idea of its duty to the holding of an examination. It held a junior examination which had not succeeded and could not succeed because it was not based upon the essentials of success. The Chamber of Commerce could take, as M. Siegfried had pointed out, a suzerain position with regard to commercial education. They could say "Such and such are the subjects, a knowledge of which the merchants of London desire in a young man of business?" They might indicate in what direction the present system is imperfect, they could point out the importance of modern languages, and merchants could say, if they would—and would say if they were well guided in this matter—that they would only have in their employ those who could speak colloquially one or two languages other than English. The point has been raised of the founding of the right kind of commercial school, and, as had been pointed out, there were three grades of schools that might be founded—a primary school, a secondary school, and, if he might so call it, a college school—all dealing with different parts of commercial education. But it was for the Chamber of Commerce to say what was needed in those schools, and either to found them themselves or get the educational authorities of the country to do so. At the present time the Chamber had simply the idea of getting together a certain number of wealthy men who were willing to give prizes—prizes to be scrambled for. The schoolmasters in England did not think highly—to put it mildly—of the Chamber of Commerce from the educational point

of view. He had sat on the committee with Mr. Hooper, and he was enabled to say with what modesty the merchants of London sat round the committee table and said nothing when the question of this commercial education was being discussed. It was left in the hands of two or three persons. The Chamber had not yet learned, in this democratic age, how to call together a representative society. If they called together such a committee, it would soon become evident that it was for educationalists to provide, and for the Chamber to say what its members wanted the youths of this country to know; and under proper conditions as to age (and a curriculum not over-complicated, because they could never put a quart of liquor into a pint pot), and under defined conditions, the schoolmasters of England would undertake to provide the Chamber of Commerce and commercial men with the youths they required. But, to do this, that organisation was wanted in England—now conspicuous by its absence—which had enabled France and Germany to do so much.

Mr. J. AUSTIN JENKINS, B.A. (Cardiff), said he should like to say how grateful he was that the subject of commercial education had been given so much prominence in the Congress. It seemed to him that in this country we were in great peril of specialising over much, and in doing this too early in the scholastic career of the scholars, and he thought it would be a bad thing in many respects if this specialisation were allowed to enter too largely into the curriculum, and into the working of the secondary schools. The chief duty of a school was to develop the general intelligence of the child—not so much to give him information as to develop his faculties, to increase his intelligence, to widen his powers of observation, so that when the child had grown in years, and had manifested an inclination in the direction of commerce, or law, or science, or literature, he could bring to bear upon those subjects a mind well developed and trained. It was incontrovertible that as a class, clerks were wanting in general intelligence. They could work the type-writer splendidly, but they had no initiative or resource. Not only was it necessary to develop the general intelligence of those who were to be clerks, but it was necessary to avoid over-specialisation in order to widen the interests in life of business people. Generally speaking, business was exceedingly dull and monotonous. He thought, therefore, that it was necessary for them to give all the attention possible in the schools to the development of the general intelligence, so that a man's interest in life should not be confined to the trade or pursuit for which he had been specially trained, but that to some extent the dreadful monotony which was inseparable from ordinary business life might be counteracted. If the Chamber of Commerce were to start a College of Commerce in this great city, it would do a vast amount of good, directly or indirectly—directly it would do a great deal, indirectly a great deal more. It would be a constant stimulus to Chambers of

Commerce throughout the country to take a greater interest in commercial education, and to bring themselves into closer touch with the various technical schools in the country, who were trying to do something in this direction. It would also stimulate the university colleges in this country. Most of the ambitious university colleges, as soon as they had the money, established a faculty of law. They had eminent professors, but very few students, because, after all, there were not many men engaged in the law who wished to know more about the law than was absolutely necessary to advocate a case successfully before a County-court Judge, or a stipendiary Magistrate. He might be very heterodox, but, so far as he could see, it was much more important that their university colleges should establish faculties of commerce than that they should establish faculties of law. Take the case of Wales. In 20 years time they would have a large number of graduates. What were they going to do with them? They could not make all Welshmen preachers or teachers. There was one solution for the difficulty, and that was that they should get the university colleges of Wales to establish faculties of commerce, and get competent men to lecture on commercial geography, commercial law, and kindred subjects, three months in the year at Cardiff, three months at Bangor, and three months at Aberystwyth. They would then do a great service to the world if they could send out men and women from those Welsh University Colleges of Wales who were well versed in commerce. It was important that to some extent each locality should decide its curriculum for itself, and in that connection it was interesting to note that whereas in the Cardiff Technical School they could not get a class together for German, strange to say, Spanish was a popular subject. Why? Because of the large iron trade between Cardiff and Bilbao. That showed that certain discretion should be vested in the hands of the local authorities.

Mr. D. SAVAGE said it would appear from the remarks of some of the speakers that afternoon that commercial education was very much neglected in London, but he was connected with one institution, and knew of others, where classes are not attended by Germans only, but by English young men, who had worked hard in offices all day, and devoted their energies to the study of commercial subjects. He believed that one reason why so few presented themselves at the examinations of the London Chamber of Commerce was because there were so many examinations overlapping one another. He hoped that if any higher school of commerce were to be founded, it would be under the Technical Education Board rather than the London Chamber of Commerce, because it was more the function of the one body than the other. Although the Chamber of Commerce had done much to encourage higher commercial education, yet a body which was called into being in order to devote itself to higher educational matters should be the body

to organise a system of commercial education in London.

The CHAIRMAN said he had listened with great interest to the remarks of Mr. Jenkins, but he would venture to suggest to him that commercial education could only be given in a centre of commerce. To teach commercial education at Bangor or Aberystwyth would be absolutely hopeless, and he would advise it to be confined entirely to Cardiff, or, in the case of North Wales, to send the students to Liverpool, which was a real centre of commerce. He thought that any proper commercial education ought to embrace within its scope a department of commercial law, and in that sense he was in thorough agreement with Mr. Jenkins's remarks.

Mr. HOOPER considered the Technical Education Committee of the London County Council could, if it were found desirable or necessary, found and conduct a High School of Commerce, better than the London Chamber of Commerce, as it could call upon the rates for funds, which the London Chamber of Commerce could not do. The Chamber had given a great stimulus to the teaching of foreign languages, in the way that merchants wanted them—not a book knowledge only, but to be written and spoken easily. As to the number of candidates at their examinations, of course they fluctuated, this year there is a large increase, more especially with regard to higher commercial education, and he thought that the London Chamber had given a satisfactory lead in this very important question.

## THE PROVISION OF HIGHER COMMERCIAL EDUCATION IN LONDON.

BY SIDNEY WEBB, LL.B., L.C.C.,

Chairman of the Technical Education Board of the London County Council.

When in 1893, Professor James reported to the American Bankers' Association upon the provision made for commercial education in the various countries of Europe, he was able, practically, to omit all reference to the United Kingdom, on the ground that nothing of the kind existed there.\* This statement is, as we shall see, no longer completely true, even if it ever was. But every foreign observer continues to be puzzled by the contrast between the boundless and ever-increasing business trans-

actions of the British Empire, and the lack of provision for the technical training of those who are charged with them. The main cause of this deficiency is, undoubtedly, the ingrained belief of the English business man that there is not, and never can be, any "commercial education" comparable with that which a man "picks up" in the actual business of daily life. The most intelligent merchant never dreams of seeking for his son any special "commercial education": he either sends him to Oxford or pitchforks him straight into his office.

During the last ten years, in particular, this lack of commercial education in England, and the failure of business men to appreciate the need for it, has been a matter of serious concern to those interested in technical education. Every writer on the subject has bewailed our backwardness.\*

Since the conference convened by the London Chamber of Commerce in 1887 the subject has been persistently pushed by that body, which deserves credit for its early and unwearied efforts. Other chambers of commerce have since taken the matter up and have set on foot promising investigations.† Here and there a town council has fitfully bestirred itself to help elementary evening classes in French and German. But all the attempts have hitherto failed to create an organised system of commercial education in the United Kingdom, or, as it must be added, accomplished anything to speak of in the way of converting the ordinary business man to a belief in the subject.

This failure I attribute largely to the absence of any clear conception of what is required.

### *I.—Our need is for more Commercial Instruction not better Commercial Education.*

"The Englishman enjoys the best commercial education in the world," I heard one eminent German remark. "What he needs is more instruction in commercial subjects." The distinction is fundamental, and the failure to understand it accounts for much of the apathy or hostility of business men to commercial

\* "The Education of Business Men in Europe." A Report to the American Bankers' Association by Professor E. J. James. (New York, 1893, pp. 232.) See also three other reports of the American Bankers' Association, entitled "The Education of Business Men, I, II, III. (New York, 1891-3.) For access to some of the works cited in this paper I am indebted to the courtesy of the Education Department, and the admirable library lately established in connection therewith under the direction of Mr. M. E. Sadler.

\* See, for instance, the chapter on the subject on "Industrial Education," by Sir Philip Magnus (London, 1888); "Studies in Secondary Education," edited by the Rt. Hon. A. H. D. Acland and H. Llewellyn Smith (London, 1892).

† Mr. J. J. Findlay's instructive "Brief Report on Commercial Education in England," made to the Sheffield Chamber of Commerce, 1891; together with the Report on Commercial Education presented to the Associated Chambers of Commerce in 1887.

education. Those who push schemes of what they call commercial education do not deny that far and away the best training for a business man is to be gained in business itself. They make no proposal to supersede the merchant's office by the school, or to substitute any academic pupilage for the apprenticeship of the City. Public opinion is only just learning that technical classes are no substitute for the workshop, but only its complement. In the same way, schemes of commercial education are not intended to train the business man, but only to teach him things that he does not, as a rule, pick up in the City. He may do without this knowledge. He may hire someone else to supply it. But, speaking generally, he cannot get it from any other source than a definitely organised educational institution.

*II.—Commercial Education must be divided into three distinct grades.*

There is, first, the education of the youth before he enters business life. There is, second, the provision of opportunities of evening instruction for the young clerk. And third, but perhaps most important of all, there is what may be called higher commercial education, required by the officer of the commercial army, if not by every ambitious member of the rank and file. Unless we distinguish clearly between these three grades, we shall all be at cross-purposes.\*

*III.—We need more variety in our secondary schools, including some which should prepare boys deliberately and purposefully for business careers.*

This is part of the problem of the organisation of secondary education, and I propose only to make a suggestion and pass on. In spite of all the improvement in middle-class schools, since Matthew Arnold bewailed their inefficiency, they still seem to me to suffer from not being quite sure what they are aiming at. I do not pretend to know what school curriculum will fit boys most successfully to be clerks or merchants, civil engineers or bankers, actuaries or chemists. Such a curriculum would perhaps have no very obvious connection with their future work. But I cannot believe that the best curriculum in each of these separate cases is identical with the best curriculum for all the rest, and for a university career. The idea that a "good general education," of a literary or classical type is an

adequate, if not indeed the best, preparation for every kind of career, sounds like a survival from the middle ages.

Without for the moment touching on the question of university curriculum, we may infer that there should, at any rate, be a clear distinction between an educational course which ends at 15 or 16, and one which is intended to be continued up to 22 or 23. Yet so strong in England is the tradition that education is one and indivisible, that the vast majority of "middle schools" go the same way as the "high schools," habitually working up to the same system of examinations, whether emanating from Oxford, Cambridge, or London Universities, or the College of Preceptors, and pursue accordingly much the same curriculum with merely minor variations as to the relative time allowed to the several subjects. I speak entirely as an outsider with no knowledge of the needs and organisation of secondary schools. But this muddling up together of "gymnasium" and "realschule," of "lycée" and "école commerciale" cannot but be detrimental to both varieties. There must be room for some schools, which need not be called commercial schools or bear any other badge of supposed inferiority, but which should reject all connection with the university, which should altogether exclude its influence, which should decline to follow its traditional curriculum, and which should arrange a course of studies deliberately based on the needs of boys who will become clerks in City offices at 15 or 16.\*

This, I know, will be misunderstood, as involving a too-early "specialisation," the loss of culture, and so forth. What I am advocating involves no "narrowing" of the curriculum. It implies, on the contrary, the inclusion of much more culture, the taking of a wider view of existence, a great deal more of "seeing life truly and seeing life whole," than the average secondary schoolmaster, experienced only in one narrow line, is as yet either capable or conscious of. One of the greatest difficulties in the way is, indeed, the lack of adequately trained teachers. But it does mean the abandonment of scholastic prejudice and tradition in favour of a purposeful adaptation of means to ends. It means putting a great deal of deliberate contrivance into the business

\* The French law of 1888 on Technical Education recognised three grades of commercial education.

\* It is the crudest of misconceptions to suppose that such a curriculum would be made up of shorthand and book-keeping, or the playing at commercial transactions, once tried (and, I believe, abandoned) in some German "commercial institutes." The inimitable Stock Exchange school, described in R. L. Stevenson's "Wreckers," is scarcely a wilder parody.

of making the most of three or four years of a boy's life.

I do not pretend to suggest what form this contrivance will take in each case—how to produce the greatest possible efficiency without impairing the whole man. There is evidently much to be learnt from abroad. Anyone reading the prospectuses of the “*écoles supérieures de commerce*” of the principal French towns—and I know nothing more of these institutions—will be struck by their deliberate choice of subjects, with a single eye to turning out the best, and therefore the most highly cultivated, business man—the complete absence of Latin and Greek, but, on the other hand, the very high development to which other teaching is carried.\*

The London Chamber of Commerce has, for ten years, been striving in this direction. But its examinations in commercial knowledge, carefully elaborated as they are, cannot compete in popularity with the examinations emanating from the Universities, or from the College of Preceptors, which drag the school curriculum in another direction. The experiment of providing schools giving an education deliberately and exclusively directed to turning out the best possible (and therefore, let me repeat, the most highly cultivated) commercial clerk, or business man, will probably have to be tried by some public authority, able to afford to disregard both scholastic tradition and parents' snobbishness. We do not want all our schools to be of this type, but there might, at any rate, be one such. Such a school, for boys between 12½ and 17, was established as long ago as 1863, by the Paris Chamber of Commerce itself, and has ever since continued to be most successfully managed by one of its committees. It has now over 500 pupils, drawn almost entirely from middle class “business” households, residing in the very heart of Paris.†

*IV.—The special commercial instruction of the young clerk is part of the work of evening educational institutes. What is most needed here is the employers' co-operation and encouragement.*

London is pre-eminently the city of clerks, containing not only a far greater number than

any other centre, but also, probably, a greater proportion to the total population than elsewhere. For their evening instruction in French, German, Italian, Spanish, and Portuguese, as well as in arithmetic, book-keeping, type-writing and shorthand, there is now fairly good provision made at more than a score of public institutions in different parts of the metropolis, which number in these subjects alone probably 10,000 separate students.\*

But 10,000 students represents only a small proportion of the young men and young women in London between 15 and 25, and I fear we must conclude that the great majority do not trouble about anything but cricket or bicycling after their office day. This is where the German clerk gets ahead of us. “I would much prefer English clerks,” said the head of one of the very largest firms in the City, “but I find my office full of Germans. The English clerk takes no intellectual interest in his work, and seems to give his mind to sport.”

If employers made a point of letting it be known they liked their clerks to attend evening classes, and considered the fact in their promotions, the 10,000 students might soon be multiplied fourfold.

*V.—In the teaching of modern languages, in particular, England is behind both Germany and France in method and variety.*

All competent witnesses seem to agree that English teachers of foreign tongues, whether in day schools or evening classes, have much to learn from Germany in pedagogic method. All testimony points to London being far behind both Berlin and Paris in the number of languages actually taught. There is one secondary school in London, and I believe one only, where Spanish is taught (the White-chapel Foundation School). England does more trade with the East than any other country, but the young city clerk or commercial traveller who sought to learn modern Greek, Arabic, Turkish, Persian, Malay, Armenian, Chinese, Japanese, Annamite, Hindustani, or Tamil—to say nothing of Russian, Dutch and Norwegian—would find considerable difficulty in getting instruction at low fees and con-

\* See, for a complete list of these and other schools, “The Annuaire de l'Enseignement Commercial et Industriel,” par Georges Paulet (Paris, yearly), pp. 700; and “L'Enseignement Commercial et les Ecoles de Commerce en France et dans le Monde entier,” par Eugène Léauty (Paris, 1886), pp. 778.

† “Notice on the Commercial Instruction organised by the

Paris Chamber of Commerce” (Report to the Chicago Exhibition, 1893), Paris, 1893, pp. 192. “Industrial Education,” by Sir Philip Magnus (London: 1888).

\* See the “Fourth Annual Report of the Technical Education Board of the London County Council,” London, 1897, 62 pp. This total does not include the evening continuation classes of the School Board for London, which teach type-writing, shorthand, elementary French, &c.

venient hours. As a matter of fact, the School of Oriental Languages, promoted by the Imperial Institute in conjunction with University and King's Colleges, fails to secure more than an infinitesimal number of students, and these few are, I am informed, almost entirely non-commercial. I understand that in all the languages that I have named, together with others, there are successful classes in Paris, Vienna, and in Berlin, not only at one, but in most cases at several different centres, and sometimes absolutely free of charge.\*

*VI.—But our most striking deficiency has hitherto been in higher commercial education—the provision of higher instruction in commercial subjects for the business man.*

Let us see the sort of technical education a young Frenchman has open to him, as a preparation for the actual training of business life. Besides founding in 1863, the "Ecole Commerciale" already described, the Paris Chamber of Commerce purchased in 1869 an old private institution, and transformed it into the present "Ecole Supérieure de Commerce," for pupils between 16 and 20. Here the young business man gets an exclusively commercial education of the highest school type, to which I believe we have nothing corresponding in this country. But beyond this again stands the "Ecole des Hautes Etudes Commerciales," which is intended to give pupils between 19 and 22, who have already completed their secondary education, two years special training in the subjects needed by the banker and merchant. It is, in fact, an institution of University rank, exclusively devoted to commercial subjects. Its magnificent premises, situated in the very heart of Paris, have cost over £100,000, and are only intended to accommodate 300 students.

The course of instruction includes besides handwriting, arithmetic, book-keeping, and two foreign tongues, economic and commercial geography; history and principles of commerce; political economy; elements of the commercial law of the principal countries, their customs, tariffs, and commercial systems; factory legislation and similar regulations affecting industry; and the study of means

and routes of transportation throughout the world.\*

I need not say that Berlin in no way falls behind Paris in all these respects; and the chief provincial towns of France and Germany offer educational opportunities of the same kind, though, of course, on a smaller scale.†

*VII.—The London School of Economics and Political Science as a High School of Commerce.*

London has now got the beginning of a "High School of Commerce," in an institution started quietly in 1895, and already affording an experience of great interest. The London School of Economics and Political Science was founded by a little committee, who believed it possible to create a demand among men engaged in the practical business of life, for instruction in the concrete applications of economics to the affairs of commerce, finance, and public administration. The London Chamber of Commerce had already tried the experiment of inviting Dr. Cunningham to give a course of lectures on Commercial History, which had been well attended by attentive audiences of young business men. That experiment was followed up, systematically extended to other subjects, and made part of an organised course of education under the directorship of Mr. W. A. S. Hewins, M.A., of Pembroke College, Oxford. Through the intermediation of the Technical Education Board, the new "school" was placed in communication with the London Chamber of Commerce, which readily lent its premises for some of the work, and in every way promoted the idea.

The school is now completing its second session, during which it has had over 400 separate students, men and women, from 17 years of age upwards, drawn mainly from two classes. The greater number belong to the class of clerks, managers, and young business men, engaged in banking, commerce, insurance, railway administration, or the Government service (national or municipal). The minority belong to the student class, including between sixty and seventy post-graduates, specialising on economic or politi-

\* "Notice on the Commercial Instruction organised by the Paris Chamber of Commerce" (Paris, 1893); "L'enseignement Commercial et les Ecoles de Commerce," par Eugène Léauté (Paris, 1886).

† "Das Kaufmännische Fortbildungsschulwesen Deutschlands," von Harry Schmitt (Berlin, 1892), pp. 211; "Kaufmännisches Fortbildungsschulwesen," edited by Dr. Siegemann, vol. II, pp. 436 (Brunswick, 1896).

\* See, for instance, "Das Commercialle Bildungswesen in Oesterreich-Ungarn," von Franz Glasser (Vienna, 1893), 422 pp.

cal science, and representing, besides the British seats of learning, Universities from Moscow to Chicago, and Buda-Pesth to Tokio. Among the "business" students, with whom I am more closely concerned here, are a few "principals," bankers and merchants, actuaries, and insurance-brokers, railway managers, and heads of important public departments—but the majority are naturally young men in subordinate positions, for whose convenience the bulk of the work is done between 6 p.m. and 9 p.m. One or two business houses have paid the (very low) fees for their own clerks, and this course has been adopted by two railway companies, the Great Western and the Great Eastern, whose example will probably be followed by others.

The curriculum of the school includes commercial history and geography; the principles and practice of banking, currency, and the foreign exchanges; commercial law; the economic and industrial history of the principal countries; the history and incidence of taxation, including customs' tariffs; the principles and practice of railway administration at home and abroad; the history and present position of factory legislation and trade unionism; the methods and interpretation of statistics, with special reference to commercial, financial, railway, and administrative statistical returns; together with systematic courses in economics. There are also departments for political science (including the study of foreign constitutions and municipal government) and palæography (for historical students). Among those who have lectured or taken classes at the school may be mentioned the Right Hon. Leonard Courtney, Sir C. P. Ilbert, Mr. Westlake, Q.C., Professors Foxwell, Cunningham, Gonner, and Edgeworth, Mr. W. M. Acworth, and Mr. MacKinder.

In connection with the school, there has been established a unique specialist library, the British Library of Political Science, which has united in its subscription list statesmen and economists, great officials and business men of all parties and shades of opinion, including the Duke of Devonshire, Lord Rosebery, Mr. Balfour, Mr. Chamberlain, Professor Marshall, Mr. Lecky, Lord Welby, the Archbishop of Canterbury, and Cardinal Vaughan, with such representatives of the business world as Sir Samuel Montagu, Sir John Lubbock, Mr. F. D. Mocatta, Mr. T. F. Blackwell, Sir J. Blundell Maple, Sir J. C. Dimsdale, and Mr. Spicer. The rapid growth of the institution has been made possible, partly by private donations,

partly by the cordial aid and generous support of the London Chamber of Commerce and Society of Arts, the Worshipful Company of Clothworkers, and the Technical Education Board. There is every prospect that its excellent new premises at 10, Adelphi-terrace, Strand, will, by next session, already be too small for its work.\*

*VII.—Higher Commercial Instruction must take the form of concrete application to each branch of business, and must, therefore, be highly specialised.*

The two years' experience of the London School of Economics and Political Science, together with that of the London Chamber of Commerce, the Institute of Bankers, and some other bodies, affords some interesting lessons.

(a). Higher commercial education in England must, like the technological instruction of artisans, be not a substitute for the training of the office and the workshop, but merely its complement. Hence it must be given to men already engaged in business, and, therefore, at hours convenient to them. If there is to be a "higher commercial" side to the new London University, it must be for late afternoon or evening studies.

(b). It is useless to appeal to the clerk or the business man *as such*. The great world of clerks and business men, who seem to the academic student to form a single class must be broken up. The merchant, the ship-owner, the cornfactor, or produce broker, and their *employés* may, perhaps, form one large group. The insurance clerks, actuaries, and public accountants, who, in London, must number some thousands, require something quite different. The great army of railway officials, from the assistant traffic managers down to the youngest clerk in the Railway Clearing House, need yet another kind of instruction. The clerks in banks and finance houses have specialised wants of their own. Finally there are the tens of thousands of clerks and officials employed in the various branches of public administration, for whom a distinct curriculum is provided by both Germany and France. Probably there are several other distinct groups needing separate treatment.

So long as we offer these groups indiscriminately "Commercial Education" in the lump, they will, quite rightly, pass by on the other

\* This institution is recognised by foreign authorities as a "higher commercial school:" see the description of it in "Kaufmännisches Fortbildungsschulwesen" (Brunswick, 1896), vol. II, p. 356.

side. But put before any one of these classes a definitely specialised curriculum, based on the actual needs of the calling, and experience proves that the abler, the more industrious, and the more ambitious of the young men will begin to take an intellectual interest in their occupation, and desire to learn something more about it than they pick up in the office.

(c). The fees must be low ; the young clerk is poor. Experience shows that, though elementary French and shorthand classes pay their way, "Higher Commercial" subjects, *narrowly specialised as they must be*, need to be heavily subsidised and endowed. This, indeed, is the case with regard to all education of University rank.

*IX.—What Higher Commercial Education in London now needs is encouragement, endowment, commercial support, and University recognition.*

England has not, as yet, done much for higher commercial education in the way of money or public encouragement. In French and German towns, the leading business firms subscribe largely to the commercial schools, present them with endowments and scholarships, and habitually send to them for clerks. The Government and the municipality vie with each other in their subventions. The Universities hold out a hand to the higher commercial schools, and recognise, under one name or another, their subjects as qualifying for degrees. The time has surely come for this country, and for London in particular, to follow suit. What is required is:—

- (a). For all the principal establishments to urge their junior *employés* to attend such lectures and classes as have been described, and, if possible, to encourage them by paying the fees;
- (b). For the railway, banking, insurance, and shipping companies to take a similar course;
- (c). For private donors to endow lectureships and scholarships in the particular subjects they are interested in;
- (d). For the technical instruction committees of county councils to remember that commercial education is an important branch of technical instruction according to the Act.
- (e). For the new University for London to recognise the importance of these studies

by creating a special faculty of commerce under one designation or another ;\*

- (f). For the Government to enlarge its Parliamentary grant to university colleges, by including a special sum for institutions giving higher commercial education.

THE PRESENT STATE, CLAIMS, AND PROSPECTS OF COMMERCIAL EDUCATION.

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I propose to glance at some of the features which characterise the respective forms of commercial education afforded by the leading countries at the present time, to consider some improvements which await adoption, and, in particular, to inquire what should be done by that country whose privilege it is on the present occasion to provide a place of meeting for the International Association, one of whose objects it is to stimulate attention to this subject.

Congratulation may well be offered to that European State whose political influence is now so conspicuous that, after being the first to witness definite provision made within its borders for commercial, although backward in other forms of education, it should by recent action have supplied valuable comment on the unsatisfactory position of England in this matter. Certain "British interests" will doubtless at the present Congress engage attention, the rather because England has so long been paramount in commercial enterprise, and has still longer presented an object-lesson to other countries in regard to political institutions, which help so much to explain its economic success. The *British Board of Trade Journal* has lately recorded decided advance made by Russia in the reorganization of its commercial schools; by a country which was the pioneer, one century and a quarter ago,

\* "What then is lacking in this economic (commercial) education to make it in demand? It lacks only the sanction which crowns university studies. It is not sufficient to open the doors of entrance into the schools of commerce, one must also open the doors of exit. Nothing further can be done until the legitimate demands in favour of economic instruction shall be met, and it shall be placed on a par with classical education."—"The Education of Business Men in Europe" by Prof. E. J. James (New York, 1893), p. 155. In all the Belgian State Universities, by Royal Decree of 19th Sept, 1896, there is now a degree in "Commercial and Consular Sciences," forming a branch of the faculty of law. "Moniteur Belge," 2nd October, 1896.



in work that France took up half a century later, to be followed by Germany and other great powers, by the United States of North America, and last of all, we may hope, by Bonaparte's "*nation d'épiciers*." Until 1894, Russian commercial instruction was confined to intermediate schools, without inspection, but since that year it has been placed under the superintendence of the Ministry of Finance, and drastic improvements are in process of realisation; lower commercial instruction is being recognised, and classes on the higher plane are being established, whilst the development of commercial museums receives careful attention.

Little advance has been made by our nearest neighbours since the publication, eleven years ago, of M. Léautey's *L'Enseignement Commercial*. Then already *bourses de voyage*, or travelling scholarships, had been founded by the French Government, which has since taken steps to procure employment of the holders by the consuls of the Republic. On the other hand, a notable series of articles entitled "*Nos Fils*," in the *Figaro*, last year, by M. Hugues le Roux, which culminated in that appearing on December 2nd, 1896, show that the French mercantile community must bestir themselves not a little over the transformation of modern commerce into a science. Pupils of the Paris commercial schools still continue to resort to the Antwerp Institute for the completion of their studies.

In the German Empire the commercial schools have still to re-assert their unsatisfied claims to distinct recognition by the respective Governments, only one of which imposes regulations as to the efficiency of teachers of Commercial Science, so that a difficulty in keeping up the supply is felt from time to time. Need is also felt of greater uniformity in teaching, a subject which, it has been announced, is to engage the attention of a Commercial Education Congress during the present summer. The Leipsic School, which is now the property of the local Chamber of Commerce, keeps well to the front; there within the last year special provision has been made for the instruction of foreigners. This school continues to be well manned.

The Bavarian Government Regulations of 1895 for the teaching of Commercial Science require, as preliminary to entrance for the examination prescribed for intending teachers, (1) production of a leaving certificate from a recognised Commercial School, a *Realschule*, or from the commercial division of a Technical School; (2) proof of one year's study at a

Technical High School or University, of Economics, Economic History, and Geography, and (3) evidence of practical work done in a counting-house during at least one year. The examination, written and oral, comprises (1) an essay designed to bring out the general education of the candidates; (2) Economic Geography and History; (3) Mercantile Arithmetic and Algebra; Book-keeping and Correspondence; (5) Commercial Law; and (6) Economics. The candidate must discourse before the Commission on a topic prepared twenty-four hours beforehand, undergo oral examination on such discourse, and, finally, display his teaching capacity in a technical intermediate school at Munich.

Belgium shows unabated energy in fostering its trade interests. The Institut Supérieur de Commerce at Antwerp has become further prominent as a centre of educational activity. A three years' instead of a two years' course was inaugurated in the autumn of 1896, specially in promotion of the usefulness of the Consular service of this small but enterprising State, whose merchants rely upon the guidance of skilled officials; the training of the latter, accordingly, has become a matter of vital importance in these days of international trade competition.

In the Austro-Hungarian Empire the good work done by the German Academies at Prague and Vienna is well maintained; in particular the fine museum of commodities and instruction in that department at the capital are jealously looked after.

Genoa continues to lead in the commercial education available in Italy, and teachers of its higher institute are amongst well-known contributors to the literature of Commercial Science.

In the United States of North America there continue indeed to be several "commercial" and a multitude of so called "business" colleges, but the difference between them is slight, and commercial theory is still overshadowed by the empirical treatment of these studies. The New York Bankers' Association has done good service by publishing the report of a gentleman commissioned by it to visit European Institutes with the view of bringing present requirements into notice.

How far has Great Britain awakened to her concern in this matter? The answer must be one not very encouraging. One mercantile institution, however, it must at once be said has not relaxed its efforts, since about the time of the first Congress of this Association,

to keep the claims of commercial education before the public attention: the London Chamber of Commerce has not been remiss. Year by year, through its instrumentality, has our subject figured in the agenda of the meeting of the Associated Chambers, and in every possible way, short of founding a commercial school or institute, has this body promoted the cause. It has promulgated a scheme of junior, and another of senior commercial education, instituted yearly examinations, raised money for prizes and scholarships, of which the last additions are those of the Salters' and Drapers' Companies, in aid of residence abroad, and, in conjunction with the Society of Arts (whose examinations begun forty years ago, on commercial subjects, remain in full vigour), procured the grant by the London County Council Technical Education Committee of some £1,200 for each of the two last years to the London School of Economics, whilst seeking to extend to the provinces the advantages afforded by its own examinations. The London County Council has also subsidised the commercial classes of the City of London College and the Birkbeck Institution. The Polytechnics in general offer certain classes helpful to commercial clerks.

Owing to the feeble support given by ordinary schools, examinations for commercial certificates instituted by the Universities of Oxford and Cambridge and that conducted for the Manchester Chamber of Commerce by the Victoria University have collapsed, but the Oxford Local Examinations Delegacy has for the present year provided for certain commercial subjects in its general programme, which thus receive some renewed countenance.

The Scotch Education Department has provided to a slight extent for such subjects in the examinations for its leaving certificates, but the schools in general pay little heed to this part of the syllabus. The Irish Intermediate Education Board has gone somewhat further, with apparently more support from teachers.

The examinations of the Institutes of Bankers and Chartered Accountants exhibit a high standard, and other public bodies are moving in the right direction.

To speak now of educational facilities outside the metropolis. Technical instruction committees, administering funds provided by Parliament and distributed amongst the various counties of England and Scotland, have here and there established classes, chiefly for modern languages, book-keeping, shorthand, and type-

writing; but what little effective supervision there has been was exhibited mainly in the West Riding of Yorkshire, whose general committee, it is believed, have discharged their duty in this respect better than any other like body. "Commercial subjects" have usually been co-ordinated with dressmaking, cookery, nursing, ambulance, elocution and the like! The Manchester School Board, however, deserves a word of praise for the excellent start which it has made; and it is to be congratulated on having secured the services of a gentleman, as Director, who is at the same time a chartered accountant and an able, energetic teacher.

Really good work has been done by some schools and institutions not "holding the purse." Thus the Union of Lancashire and Cheshire Institutes has stimulated commercial instruction by a fine system of annual examinations; the authorities of the Birmingham and Midland Institute have not neglected these subjects, although receiving scant assistance from local traders; and at Liverpool the Shaw-street Schools, under new management, have entered upon a career of further usefulness; the "Middle School" corresponding closely to a German *Real Gymnasium* modified by features of a *Real Schule*, and loosely to a Belgian *Athénée*; the "Commercial School," to a Belgian *Ecole moyenne*.

Few institutions seem to avail themselves of Whitehall grants for subjects such as modern languages and book-keeping. The writer has taught for one which did.

In Scotland these subjects meet with appreciation at the Heriot Watt College in Edinburgh, and from the School Boards of Leith and Glasgow, whilst good service is being rendered to commercial education by the Glasgow Athenæum. An attempt has been made at the Blairlodge School, Polmont, to approximate to continental methods by its "commercial bureau," which has been favorably reported on to the Scotch Education Department, by Mr. R. C. Millar, C.A. (1888). The circular issued by the Scotch Education Department in June, 1897, on the constitution of, and expenditure of money by, secondary education committees, tends in the direction of advancing commercial education in the north.

In Ireland, even to the extent to which certain intermediate schools avail themselves of the general examination syllabus above referred to, the whole thing is in its infancy. Belfast does nothing worthy of its position as a commercial centre; Dublin still less.

Although the claim of commercial education to be organised on a proper basis has been repeatedly urged by prominent men on public platforms, and Professor Wolfrum, of the Leipsic School, in his recently issued "Bericht" for 1896-1897, remarks that in England "there is a rush to make up for lost ground," the words of M. Léautey in 1886 remain literally true: "il n'existe pas d'écoles de commerce proprement dites en Angleterre, en Ecosse, et en Irlande." Nevertheless, as he has also said, "par nécessité aussi les Anglais ouvriront avant peu des écoles de commerce."

After the passing of the Technical Instruction Act, industrial education, of course, claimed first attention, and that it has received in good measure. Even in commercial centres such as London and Liverpool, technical institutes have spent the bulk of their funds over science and art classes. There was a feeling, referred to by the Duke of Devonshire in his recent reply to Lord Norton's question in the House of Lords, that, as the Chairman of the Royal Commission on Secondary Education has put the case, the money has been "spent in an ill-directed and ill-organized way." Many who have been behind the scenes, as members of committees or as teachers, have shared that belief. Time was needed for experience to be gained, and secretaries have not always had their own way. The notion has been dominant that the great thing was to instruct workmen. As it is, few of the class contemplated have lent themselves to the process. It is now increasingly seen that employers above all should be specially educated; the claims of the commercial management of industrial undertakings have been strangely lost sight of during these seven or eight years. It can be of little use developing the productive powers of a people if the means of circulation be neglected, if we do not look after those factors trade and transport, which impart the character of "productive" to so much that is looked upon as part of the national wealth. In other words, very much more attention must be given to the *commercial* side of technical education. It is from a better educated mercantile community that the leaders of industry must draw their inspiration; such is the ever repeated opinion of all the consuls of every European country in the advice tendered by them to the Foreign Department of the State represented, of British Consuls no less than others. The conditions of international trade-rivalry have accordingly determined the course taken by economic instruction in various parts of the world.

Schoolmasters, upon whose co-operation the London Chamber of Commerce placed too much dependence, have largely fostered the really effete and always absurd idea that a youth can be taught in counting houses all that he needs to know of business. Apart from the impossibility of training a clerk in an office for anything beyond a special department of work—to which the typical schoolmaster assumes he will settle down for life—there is the striking fact now-a-days that British merchants have failed to maintain in the same way as formerly their great lead in the world. Enterprise and energy are good in themselves, but must be wisely directed. Competition governs modern life, and we must learn how to meet it; how not only to act defensively but offensively. Teachers feel pressure within their own sphere, and there have to yield to new ideas, special training in the theory as well as practice of education being now called for. Common ground is occupied by ordinary and by economic educationalists in maintaining that education on a broad basis should precede specialisation. To disparaging remarks about putting a "bread and butter" value on education, the reply is at hand, that accredited upholders of commercial education insist not only on preservation of the inherently educative value of "*Brodstudien*" in the hands of teachers, but on recognition of the fact that the old *classical* education which, it was supposed, alone could develop "faculty," has much depended within the memory of man on pecuniary considerations, although this this fact may shrewdly be kept in the background. The race for money prizes at the universities, and good places in competitive examinations, generally grounding success in life, on the part of the great schools remains as keen as ever; so stimulative is the thought of the real goal even there, the consideration all round of what will "pay" being dominant. The "commercial" spirit has infected every profession, unless we except army, navy, and diplomacy; and commerce itself has become one of the professions, as aptly shewn in the *Figaro* articles. Such is the irony of events. Mr. Pollard, head master of the City of London School, in his essay on Commercial Education gives currency to the commonplace saying that "the commercial man seeks what is of use," which, if it mean that he seeks nothing more, is worthy only of a sordid tradesman, and is a very questionable proposition as applied to the recognised leaders of the British mercantile community. M. Léautey's saying "*Les*

Anglais naissent commerçants" might have served for times gone by; so also his remark that "il semble que l'enseignement classique soit nécessaire pour idéaliser quelque peu leur esprit." There is no need to explain the past, but we have to face the future, and rest on their oars the Britons cannot. Even traditional methods of classical education are being discarded, and educationalists have now to own that it is not so much the subject but the way in which it is taught that produces intellectual result. Mr. Goschen gave voice to a common sentiment regarding average boys at the time of their leaving any of the great schools, when he complained, in an academical address given north of the Tweed, of their not having any intellectual interest. On the other hand Mr. Pollard has opportunely stated his belief that commercial education on the lines indicated in his Essay would tend to raise the general level of intelligence. Such has been the actual experience of the present writer in dealing with boys instructed in classical and commercial subjects concurrently. A good method with any of the new subjects will do more educationally for boys with no special aptitude for the old culture than the best of the now discredited methods of secondary schools.

Some advocates of higher commercial education, such as an eminent English ecclesiastic, have from time to time used language tending rather to dishearten than to encourage speedy action. Difference of opinion has been expressed as to whether it is money that is most wanted, or teachers, or students. Whilst Cardinal Vaughan, who did good service at Salford to this movement, supposes teachers and text-books to be practically non-existent, Mr. Sidney Webb finds the principal drawback in the indifference of employers, and consequently of their employees—a conviction shared by the present writer, whose correspondents at various centres testify to the apparent jealousy on the part of the former, prejudicial to clerks who might acquire greater knowledge than themselves. Some, nevertheless, employ foreign clerks already in that position of vantage! Very different is the spirit manifested by mercantile communities in other lands, which have with their own resources founded commercial schools (*e.g.*, those at Moscow, Paris, Leipsic, Antwerp). Then, as regards the clerks themselves, Mr. Bryce and others have sounded a warning note against over-indulgence in sports, for which there is, we suppose, no sufficient corrective at present.

It is the writer's belief, from acquaintance with *teachers*, that there is already a sufficient nucleus for a proper start. A certain number of the teaching profession are competent to direct higher commercial education; some of whom have had practical acquaintance with business, whilst others, after enjoying an academical training, have already done good work under technical instruction committees, if not also in commercial schools abroad, where the services of Englishmen are ever in request. There are many Continental teachers of Commercial Science who have not had like advantages; and of those who are successful instructors the teaching ability was no better accredited in the first instance than that of British chartered accountants, who yield to none of their own class abroad in skilled knowledge of any requisites, short of actual pedagogic training, for taking part in commercial education. Already Manchester and Edinburgh can here give a good account. The rigidity of regulations abroad as to proved teaching capacity is almost universally relaxed, as we have seen, in regard to commercial schools. Studying methods employed in continental schools would be helpful to Britons later on; but we have our own system of business and conditions of work to consider, and, it is believed, have more to teach our foreign brethren than they have to communicate to us: that is the impression derived by the writer from his own observation. It would be disastrous, for instance, to remodel British methods of accountancy instruction on those in vogue abroad. This does not exclude the partial employment of foreign teachers in British Commercial Schools of the near future, in like manner as the Antwerp Institute commands the services of an Englishman on its staff, and the Leipsic School those of another. Foreigners will always be attracted hither by better remuneration, but at present there is no scope for them. Of the training of English teachers of Commercial Science which, it is hoped, will be placed on a better footing than is that of their colleagues abroad, we shall have a word to say in its place.

The question of text-books is one which admits of ready answer. With the single exception of the study of commodities (denominated in German *Warenkunde*) the scholastic treatment of which, indeed, London merchants deprecate, and in respect of which publishers afford no encouragement, English readers are already provided with manuals better than those of any other country, and

this whether we think of elementary or of advanced text-books. Will anyone venture to query this in regard to commercial mathematics, book-keeping and accountancy, treatises on banking—in which the British have absolutely nothing to learn from abroad—commercial geography and history (witness the notes of the late Professor Roscher in his “*System der Nationalökonomie*”) or, in particular, economics and ethics, commercial law, and, we hesitate not to add, modern languages? British economists on the scientific, British accountants (the best in the world) on the practical side have been pioneers in commercial science; and need it be said that our people, while willing and glad to learn in respect to teaching method, have more resources where geography is concerned than any other? There is now a body of skilled British teachers of European and Asiatic languages who, after residence abroad, are rapidly developing method in oral instruction and as writers of class books. Recent English text-books in more than one branch, as the writer has reason to know, have since 1890 been adopted in commercial schools of more than one foreign country, or are being translated into German, French, &c. We venture to predict that, if such schools be established in Great Britain before the close of the century, the year 1900 will not dawn upon us before foreign teachers of the commercial sciences will have looked to this country for that guidance for which, too many suppose, we should look to them, whilst foreigners also will be resorting to our academies for knowledge which they fail to obtain elsewhere. Whilst engaged upon this paper, the writer has been requested by a foreign correspondent to recommend a Commercial School, of the type with which the latter is familiar, in London or the Provinces to which he could send his son, 17 years of age, for instruction preliminary to office work at home, and of course has been obliged to reply that such institutions are unknown in our island. It is strange that, in such a state of things, only one English youth, from Manchester Grammar School—with a scholarship granted by the County Council of Lancashire—now represents this country among the pupils of the Antwerp Institute, and that at Leipsic only three are at present registered as from this side, none of them of purely British extraction.

It remains for us to consider the organization of schools and colleges, their equipment, inspection and examination, which, however, must be done very briefly, further remarks being reserved for a work upon

which the writer is now engaged for early publication. In the absence of endowment by men of the stamp of Mason or Whitworth we must, it is conceived, look to the funds which Parliament, in pursuance of early prospective legislation, may place at the disposal of county or local authorities for discretionary creation of schools and colleges, in the exercise by them of powers like those outlined in the Bill submitted to the House of Commons in 1896. Of the means to be adopted for raising money by rates, &c., we cannot here speak. The writer may express his settled conviction that the establishment of special schools is of primary importance, entirely concurring in the opinion unanimously expressed by Continental correspondents, who regard the start so far made and views commonly expressed in this country as half-hearted, surprisingly unpractical, and unsatisfactory from even the educational point of view. The remodelling of some of our existing secondary schools after the pattern of Belgian *Athénées* would be of some use, and anything would be better than the present state of things; but to rely on infusion of economic instruction into ordinary school education would be simply disastrous. This is said with regret that we cannot here follow the views of Bishop Percival or of Sir Philip Magnus, expressed ten years ago. There is no fear of “liberal” education being swamped by specialised “commercial” instruction if schools are founded after the pattern of the Leipsic *Handelslehranstalt*, where, according to the last annual report “by far the greater part of the school hours is devoted to instruction in subjects of general culture,” whilst Academies like the Institutes at Antwerp, or that at Vienna, which are still missed in the German Empire, supply the needed guidance for Commercial Colleges in this country. The real danger lies in too close adhesion to the recommendations in the report submitted to the Associated Chambers of Commerce in 1886, shortly followed by those contained in Sir P. Magnus’s magazine article on “Schools of Commerce”—which the present writer regards as rather more satisfactory—with the result that an ineffective instalment is accepted for the time being in schools of the ordinary type. We need only instance Mr. Pollard’s remark that deciphering of German copy is a subject he “would wish never to see introduced into any school.” All depends on whether thorough-going commercial schools must await foundation, while Con-

tinental nations allow ever less grass to grow under their feet.

To an Organized Commercial School no pupil should be admitted under fourteen years of age, and only after passing an examination somewhat less advanced than the present Juniors' examination conducted by the London Chamber of Commerce, which, not falling far short of the London University Matriculation, is calculated to suit boys aged about sixteen. Encouragement should be given by scholarships to pupils from elementary or higher primary schools, who have passed at least the sixth standard, with knowledge of some specific subjects provided for in the Code which bear on commerce, to enter a secondary Commercial School. This should have a junior division or lower school in which the education given would be carried on further, so as to qualify for such an examination as that for juniors under the Associated Chambers' scheme. A pupil, having passed that, might be sent up to a senior division or upper school, but if unable to continue giving whole time to school work should be able to keep up his studies by attendance at extra courses conducted by the school staff in the early morning or in the evening,—the time of his attendance being at his own option. The difficulty will be felt here, as it still is in Germany, in prevailing upon parents to leave their sons long enough as day pupils, but this might be overcome by the continuation of scholarships to the best pupils. There should be a library, museum and laboratory for the use of the whole school.

There should further be established at all the leading commercial centres a College of Commerce, of university rank, of which pupils of the secondary school might enter as from about the age of eighteen, for a two years' course if for full time, otherwise for an indefinite period as an evening-class student.

The aim should be that every pupil on leaving an Organized Commercial School from the senior division should have attained the standard contemplated by the senior commercial scheme of the Chamber of Commerce, so as to take a leaving certificate of the value at least of the "*Certificat d'études moyennes*" granted at the Belgian *Athénées*, by the sole aid of the instruction given in the school itself.

The curriculum of a Commercial College, which would amongst other things provide special instruction for Teachers aided

by training scholarships, should be in view of a diploma, like that of the *licencié ès sciences commerciales* granted at the Antwerp Institute, one portion of the syllabus relating to material knowledge, another, which would be optional, in the teaching of mercantile subjects.

The examinations of both school and college should be regulated by and conducted under the supervision of the central authority. The special examination for teachers should be on the lines of the Bavarian regulations, which should comprise a Department having special control of this branch of education, unless the legislature, approximating to the precedent set by Russia, assign such functions to a newly-created Department of the Board of Trade. There should be a staff of chief inspectors, under whom the officers appointed by the local authority, according to whose reports grants would be made by it, should act as assistant inspectors.

The respective curricula which the writer conceives to be suitable to such schools and colleges will be discussed by him in a forthcoming work, in which he will submit model time-tables and offer suggestions on teaching method. Here he will but remark that teachers in general must agree with Bishop Percival that the course of study proposed by the Chambers of Commerce for schools is too complex, and insufficiently practicable, although affording valuable hints to headmasters or principals of the institutions briefly sketched in this paper.

#### A PLEA FOR THE MORE SCIENTIFIC AND SYSTEMATIC TEACHING OF BOOK-KEEPING.

BY STANLEY LATHAM.

Were an apology considered necessary in introducing the subject of this paper to the Congress I would refer my auditors to the pertinent remarks of Dr. Johnson who said, "Book-keeping is an art which no condition of life can render useless; which must contribute to the advancement of all who buy and sell, of all who wish to keep or improve their possessions, of all who desire to be wise. Let no man enter into business while he is ignorant of the method of regulating books. Never let him imagine that any degree of natural abilities will supply the deficiency or preserve multiplicity of affairs from inextricable confusion," And he might to-day have added. Those

natural abilities, if finding their arena in commercial life, unless properly checked and regulated by a knowledge and application of the art of book-keeping, may not only bring that ruin in their train, which lesser mercantile abilities sometimes escape, but will possibly place their possessor in an uncomfortable and somewhat unsympathetic close relationship with the penal law.

The importance of a knowledge of the subject, however, is not confined to those only who are known as business men, for it is of equal importance to every member of the community who appreciates the variabilities and potentialities of the term "Income" and the often times unexpected and unexplainable vagaries of its correlative, "Expenditure." Since the days of Lucas di Borgo, hundreds of treatises have been written upon it, hundreds of persons have been engaged in its teaching; certificates of capabilities have been issued by public bodies and societies testifying that the holder has passed their examinations in book-keeping; and yet I undertake to say that probably 75 per cent. at least of the persons who have been taught, and are presumed to be book-keepers, are incapable of anything beyond the most mechanical and elementary work. The reason for this is not far to seek. From my own experience, both as a pupil and as a teacher, I am convinced, first, that most of the so-called text-books are inefficient, and, second, that those who profess to teach, either do not understand the science of systematic and sympathetic teaching, or that they lack that wide experience of this important subject, without which it is almost absolutely impossible to rightly teach the art of Book-keeping.

Consider for a moment what subjects are inseparable from the art:—Practical Arithmetic, Commercial Law, Banking, Political Economy, and last but not least, Ethics, as distinguished from the phrase "Commercial Morality." The field of instruction to be covered is not small, and yet no surprise seems to be aroused at the temerity of many who attempt it as instructors, whose position has been gained from the mere fact of their having acted as book-keepers themselves; their limited and imperfect practical experience being supplemented by probably an inefficient, but trouble-saving text-book.

Involving, as it would, some of the technicalities of book-keeping, it is as impossible as it would also be inappropriate for me here to give some glaring examples of the results of the teaching which have come before me during the

past thirteen years. It will suffice to say that they resolve themselves into this:—That numbers of certificated pupils, after spending many months in obtaining their certificates, and then fondly believing that they deserve them, when asked to give reasons for their work, have been quite unable to do so, and when given a set of books differing in detail from those on which they received their diploma, displayed little more than that amount of knowledge to which total ignorance is almost to be preferred,

This state of things, I am afraid, is largely due to the fact that book-keeping is not recognised, or at least not sufficiently recognised, in our educational arrangements; and when it is placed in the curriculum it is often regarded as a superfluity and certainly as of no importance; the consequence being that the qualifications of the instructor do not match, in any way, those of his colleagues in their particular branches.

Let me sketch as briefly as possible the general lines on which, in most cases, it is thought that book-keeping should be taught; prefacing my remarks by saying that, on these lines, this system has always before it—that book-keeping is a practical subject and nothing more. A practical subject, the principles of which were probably deduced from an axiom of Euclid, or the properties of an algebraic equation!

The class possibly consists of twenty or thirty pupils, with ages varying between, say, seventeen and twenty-five, and each individual is duly equipped with a pen and ink, and one or more exercise-books. The students are then instructed to allot certain pages, or may be a whole book, to such titles as "Cash Book," "Bought Day Book," "Sold Day Book," "Waste Book," and "Ledger." The next step is a veritable plunge *in medias res*; they are told to write Debit and Credit (abbreviated to "Dr." and "Cr.") respectively on the left and right of the cash-book and ledger, and following this they are further told to write detailed items to the left or to the right of the former book—it being probably explained that these items are supposed to be received or paid—certain other entries are then directed to be made in the books other than the ledger, and eventually, under different titular headings, this last book is brought into play as the final recipient of the entries made in the other books, the pupil being instructed as to the mechanical positions which the entries must take. By this time he may or may not have also been intro-

duced to what are known as bill-books and possibly to others which he is informed are of a subsidiary nature, such addenda being dependent to a great extent on the taste of the teacher, the age of his text-book, or the trend of previous examination papers. Within ten or twelve lessons he proceeds by this form of instruction to complete his experience by compiling a "Trial Balance," followed by a "Profit and Loss Account," and "Balance Sheet," and he is then the complete book-keeper.

Such is very broadly the method of instruction pursued in the large majority of cases in teaching book-keeping, a method founded on the old but sometimes mistaken aphorism that a minimum of practice is worth the maximum of theory. The required result is however achieved; the student by mere mechanical practice in a quantity of detail and by the examiner's knowledge of past examination papers is enabled to scrape through an examination and so to obtain his certificate of capability in an art of which, in reality, he knows next to nothing.

From this the question naturally arises, What then is a proper system of which book-keeping should be taught? I would like to premise the few observations I have to make in answer by saying, that unpoetical as the subject is, one might almost class the proficient book-keeper as one among those not made but born; for although, by careful attention and training, most men of ordinary abilities may become passable keepers of books, it is but a small percentage of those who would learn that will ever become proficient book-keepers. I have already mentioned with what other subjects that of book-keeping is necessarily affiliated, and regarded from my point of view, I must insist that in teaching book-keeping on a complete and proper system it is absolutely essential to include these subjects in the curriculum if proficiency is to be obtained; and I suppose that that is the object in view as regards our students. In short I contend—a contention based on my own experience—that book-keeping must be taught on a more scientific, as distinguished from the existing practical method. In advocating this departure from the accepted mode of teaching it is of course incumbent upon me to suggest some definite course which should, in my opinion, be pursued. First then, the preliminary step will be to see that the pupil is grounded in a knowledge of practical arith-

metic—for without this as a nucleus it will be impossible to proceed—assuming this knowledge, which in the ordinary course of education will have been obtained before the student of book-keeping left his or her school, I suggest that the next stage should take the form of a short course of lectures, illustrated if possible on the blackboard—on the place and importance of book-keeping in commercial life and for statistical purposes. These lectures would necessarily include the practice of arithmetic and the other subjects to which I have already referred, which might be called "affiliated subjects;" definitions, commercial signs, abbreviations, and expressions would naturally follow, and this purely theoretical course would be completed by giving and explaining the axioms and formulas of the art. A very full printed synopsis of each lecture should be provided and presented to every student.

After the final lecture of this course it is desirable that a test should be taken of the amount of information that has been acquired and retained by the students, such examination having for its object the justification or otherwise of proceeding to amplify theory by bringing it into operation in practice.

Now although this first stage is to be allocated altogether to theoretical work it must not be imagined that that division will thereby be exhausted; on the contrary it will crop up at every important step when the student commences his practical work. It is impracticable to cut the two, so as to form two absolutely distinct divisions, but I am convinced that the student will have his way cleared for him, will understand better and take an infinitely greater interest in his future work if he has as a preliminary passed satisfactorily through the first course. We now have to take the practical and the theoretical in combination, and the end of this second course should leave the student in a condition to understand everything he has done and is doing, as well as capable of undertaking the proficient keeping of any set of books and of understanding any system of accounts with which he may be brought in contact. With these objects to be attained he must begin, if one can be allowed the expression, from the beginning, from the most rudimentary forms from which he has to obtain information to build up his various books, and which will eventually culminate in a complete and correct analysis of his own or of his employer's financial position. He must be taken through all the



rudiments of book-keeping and accounts common to a certain model business, and proceed step by step so as to embrace in his experience almost every condition and important variation under which the books and accounts of that particular business can be kept, every opportunity being taken to explain the possible bearing on these transactions of what I have called the affiliated subjects. Questions must be invited, and the pupil must be encouraged to give opinions on and reasons for his work, the practical doing of which it is advisable should be more from his own judgment and discretion than from any direction given by the teacher.

Having taken him through one model set of books he should then be given another set of a totally dis-similar character as regards the business of which they are the records, but to which he could apply some of the experience previously obtained.

He must not, however, stop here, for although the principles of double-entry book-keeping are universal, the application of those principles varies considerably, and the book-keeper should, if thoroughly trained, in that training at least, have some experience from model sets of books of the diverse requirements of professions, merchants, brokers, insurance and other companies, charitable and similar institutions, the Civil Service, local authorities, bankers and others. It will therefore be necessary to see that he has some acquaintance, at least, with the more patent standard variations which exist in the systems of accounting adopted by, and found necessary to different individuals and bodies, and for my own part I would not have this done per-

functorily, as heretofore, but devote to its study considerably more time and attention so as to obtain a result which could be compared with the best training he now receives in other subjects. Finally, the training ought to include instruction as to the methods for employing the art of book-keeping as a preparation for actuarial and statistical work.

We, who almost every day have to experience the results of an insufficient, or possibly the complete lack of, knowledge of the subject-matter of my paper, can only complain; and it rests largely with societies holding examinations and issuing certificates to see that their examinations justify these diplomas, or at any rate make them of some value. The form of examination questions, if I may say so, is at present based on lines too English, too old-fashioned. Let questions be more suitable to this end of the century's requirements, and the more thorough and scientific system of teaching which I advocate must follow. My subject, I venture to think, is important enough for the very best and fullest instruction. As taught at present, it is one remove from valueless, but when taught properly and afterwards conducted upon sound principles, it is invaluable. "Book-keeping not only shows the general result of a commercial career, but admits of analysis by which the success or failure, the value or worthlessness of its competent parts, or each particular transaction, can be easily ascertained. In a word, on the one hand it promotes order, regularity, fair dealing, and honourable enterprise; on the other, it defeats the machinations of dishonesty, and preserves the integrity of man when dealing with his fellows."

FRIDAY MORNING, JUNE 18, 1897.—SECTION A.

The Right Hon. A. J. MUNDELLA, M.P., in the chair.

# THE TEACHING OF DOMESTIC ECONOMY IN GIRLS' SECONDARY SCHOOLS.

By MISS MITCHELL.

Just as the higher education in general of girls distinctly gained by its late introduction, and was able to advance untrammelled by the rigid traditions hampering boys' schools, so the technical branch of that education may be expected to gain by the earlier introduction of technical work for boys. The introduction of technical work into girls' elementary schools will also lead to more satisfactory arrangements when the secondary schools take such work into serious consideration.

The influence of the technical work of boys upon that of girls seems at present to be distinctly harmful. Because metal work and carpentry have been found to be of great educational value, even when taken once a week, developing muscular dexterity and habits of exactness, the work considered suitable for girls has been run on very similar lines, a short occasional class being considered sufficient, in spite of the great differences in the operations, and the great variety of the materials used. Because a young boy gains much by his weekly wood-work, it by no means follows that a girl gains as much by her weekly cookery.

The work in elementary schools has been much hampered by the early age at which the pupils leave, and in the case of the girls, the cookery suffers from the difficulty of disposing of the materials used.

In High and Middle Schools the work can scarcely be said to have been taken up seriously—the classes being restricted usually (1) to those willing to pay a small fee, or (2) to a small proportion of the girls, entry to the class being a privilege. The last consideration is the individual educational requirement of the girls. The subjects have been almost exclusively cooking and needlework, dressmaking classes being special and plain needlework alone taught throughout the school. Laundry and house management have been left severely alone.

Now let us first consider the qualities in which the pupils turned out by the girls' secondary schools seem to be wanting. If the schools were doing their work properly one would expect their scholars to come to a domestic economy school, ignorant of the subject-matter, but with a thorough acquaintance with the nature of the materials used, and the natural laws involved in the various processes, ready with methods of investigation at their command, with well-trained senses and mental and muscular control sufficient for them to develop a new set of habits or a new skill. But they come to us wanting in all these points. Where they have taken inorganic chemistry, it has not been quantitative, and has dealt with materials quite apart from those used in ordinary domestic life. Their knowledge of elementary physics is nil, and systems of ventilation, construction and management of stoves, systems of drainage and water supply, are as difficult for them as any other student.

In practical work they stand no chance against the girl who has been compelled by circumstances to turn her attention to practical matters, such as the eldest girl of a large family, or a girl who has for any reason had to undertake home responsibilities. She is observant so far as her eyes and ears are concerned, but not with her other senses, and she is not "common-sensed," does not foresee results, does not translate theory into action. In theoretical work she does much better than in practical. Everyone must acknowledge that the great failure of High School work is due to the absence of the practical side, and the time-tables at present seem to forbid the introduction of any such. At present the school hours are four in the morning, with an occasional afternoon class of  $1\frac{1}{2}$  hours. The morning is usually given up to five lessons, and I think, as compared with schools where the length of each lesson is longer, that a considerable amount is got into these; the mistresses and classes work at a very high pressure.

Now, practical work of any sort, either of the scientific or technical type, must be expensive, with regard to materials used, and

especially with regard to expenditure of time. A practical class of three-quarters of an hour is absurd, especially where any attempt at exactness is made. An hour and a half is the least length, and two hours is better. The number of pupils must be limited, though a large class can be managed if greater time is given to preparation of apparatus, the class losing in habits of independence.

At present, head mistresses scarcely seem to have realised that a science or technical mistress cannot undertake a practical class of any size at a minute's notice, that a large part of her work must be done outside the class. A master preparing a theoretical chemistry lesson, does not consider two hours preparation by himself and a laboratory assistant excessive. It requires a very good teacher, an expert class, and copious apparatus, to start a practical lesson without previous arrangement. How many head mistresses would be satisfied with a practice lesson of two hours, or two hours separate theoretical lessons illustrated with experiments, as an equivalent for the ordinary morning's work of four hours given to five lessons? In how many girls' schools is there a recognised laboratory assistant for keeping account of apparatus, washing up, and keeping a laboratory in order?

It must be borne in mind that women are naturally not apt to turn to practical work. They have taken to this branch of modern education more slowly than to any other, and have made less mark in branches of experimental science than in mathematics, art, and literature. How much of this is due to generations of bad education, and how much to natural incapacity, is yet to be discovered; but in any attempt to carry out practical education in girls' schools, mistresses, usually requiring no spur and showing most scrupulous thoroughness in their work, will have to be warned against avoiding and slurring over the practical work for the sake of the theoretical.

At the present time, girls' education is being very much starved for want of money, an endowment of £1,500 per annum being considered large for a girls' school, while £4,000 per annum is considered very small for a boys' school. An expenditure of £5 for laboratory equipment for a girls' school is a serious matter, and even the flasks and test-tubes necessary for the simplest work would scarcely be forthcoming in sufficient quantity in many schools. This difficulty can sometimes be overcome by converting the school into an

organised science school or by qualifying it for County Council aid.

So much for the general difficulties. The next point to be considered seems to be the practical work which could be most suitably introduced into a High School, and then we ought to consider the resources of such schools which might be turned to account in teaching domestic economy or technical work proper.

Now, in the Battersea Polytechnic, we have two schools from which information on the first point may be gathered.

#### A.—A DOMESTIC ECONOMY SCHOOL.

In this school my attention has been drawn to three points:—

- (1) That girls of about fourteen, who come to us for about twenty weeks' training in domestic economy, and have already been through two or three courses of cookery in a Board School, have scarcely any advantage over the girls who have had none. Of course it is very difficult to trace results where so many causes may interfere. The girls whom we separated out as having been previously trained were found to be somewhat older than those who had not, and so could not be judged by quite the same standard. But in spite of age and training advantages their work has not in the long run been better than that of the others.
- (2) We have a class of young voluntary school children, who come twice a week for cookery demonstrations and practice, and however carefully they are watched they gain very little skill or control over their hands. They learn, it is true, that fat being rubbed into flour must be kept cool, and that water must be added to the fat and flour, but if confronted with specially soft fat, or with damp flour, they would not know what alterations to make in processes; or, if a pudding turns out badly, they would not be able to say why. They can be taught to imitate certain processes in a sort of monkey fashion, and carry out hard and fast rules, and follow recipes, but nothing else.
- (3) Then we have students in training, some of whom have come fresh from secondary schools of good standing, some from homes where they have been absorbed in domestic matters for some years after leaving school, some from business, and

some High School mistresses. One, who had been seven years apprenticed to a trade, was an interesting case. She was a thoughtful, careful, clear-headed student, but she had great difficulty with her practical work. The cause of her failure was clear to her. She found it extremely difficult to store up sense impressions, never could decide whether the dough she was kneading was of the right degree of elasticity, whether the pastry she was preparing was sufficiently moist, whether her pie was the right tint when baked. Her memory was not capable of retaining these impressions, nor her senses quick in detecting them. In laundry work, where materials and utensils are much simpler, she succeeded very well in the end. In several cases the fresh school-girls have not been so successful as less educated girls who had had home-training. They were wanting in self-reliance and initiative. Another successful student had never been a pupil in any sort of school, being the daughter of a country clergyman. She was amusingly wanting in the "give and take" characteristics of scholars of public schools, but her practical life caused her to be very successful as a domestic economy student.

#### (B).—AN ORGANISED SCIENCE SCHOOL.

There are about 30 or 40 girls in the Organised Science School who are educated with about 100 boys. They get about  $9\frac{1}{2}$  hours per week of practical work, namely, 2 hours practical chemistry, 2 hours practical physics, 3 hours geometrical drawing, 1 hour art, and  $1\frac{1}{2}$  hours practical cookery or needlework. The teacher of cookery has been much struck with the quickness, handiness, and general progress of these girls as compared with the domestic economy girls, who spend almost the whole week in practical work, of which  $8\frac{1}{2}$  hours out of  $28\frac{1}{2}$  hours are given to cookery. The girls of both the schools come from the same Board Schools and are of much the same social standing, and come from about the same standards.

What I wish to urge is that the early introduction into a child's life of domestic economy subjects is a great mistake. The utensils to be handled and materials to be used are too varied and complex, and the senses employed are too numerous and require to be well-trained.

One might as well teach a child landscape painting or wax-flower making, the ultimate utility of the subject having no immediate bearing on the immediate educational value. Then again the acquisition of mechanical skill requires constant practice. The skilful cook or housewife must have constant practice as much as the pianist or singer; her muscles, senses and intellect must be continuously trained.

This points to the necessity of making the domestic economy work continuous, whenever it is taken, the weekly lesson being of very little value.

If the domestic economy proper is to come later what preparation for it can be made by the school, say till the pupil is about fourteen years of age?

Dr. Armstrong has drawn up an excellent syllabus of domestic science, which is, I believe, to be adopted in London Board Schools. I believe this syllabus is to be discussed later, and I need only say that its keynote is exact measurement, and the investigation of elementary chemical and physical laws or phenomena. But a cook who religiously employed a chemical balance for all her cookery, who never stewed nor boiled nor baked without a careful observation of the thermometer, who knew the nutrient value of food materials as far as any chemist knows it, which is not far, could still be a very bad cook and housekeeper.

Exactness, as the chemist knows it, is not necessary to good cookery, and a knowledge of the loss of water incurred by drying vegetables and flesh, though valuable, is not all-sufficing for the cook.

I should be extremely sorry to see any such course displace the botany and natural history of the secondary school. Any practice in classifying, in storing up and recollecting past impressions of natural objects is of great value. The botany should certainly involve a study of plant structure, and the natural history include the habits and structure of common insects, fishes, birds, and mammalia. It is not easy to over-estimate the educational and practical value of such knowledge to the student of domestic economy.

It would seem, therefore, judging from the work of our science schoolgirls and others, that about eight hours a week at least ought to be given up to practical work of some sort or another all through the school course, such work not to include any technical work proper until after the age of fourteen.

From 7 to 10 this work could include per head about—

Hours.

- 1½ Physical measurements, or some work similar to Doctor Armstrong's course.
- 1½ Clay or wax modelling.
- 2 Art, including colour work of some sort.
- 1½ Needlework.
- 1½ Botany or natural history.

From 10 to 14, per week—

- 3 Chemical and physical work.
- 2 Art.
- 1½ Botany and natural history.
- 1½ Needlework.

This could best be managed by increasing the school hours from 4 per day to 5 per day. In the organised science schools and most boys' schools, the hours are 5½ per day, and these are not excessive if a good proportion of the work is practical.

When, finally, the practical work takes a more technical form, I would urge that for a time, at any rate—at least six months; better a year—it should be tolerably continuous. Supposing school hours to number five per day, two might be given to ordinary school subject work and three to technical work; 15 weekly.

One great difficulty in introducing such work into Girls' High Schools is that parents grudge the time, and the girls themselves regard the work with a certain amount of contempt. But the latter can be conquered, and has been in some schools where the girls show a marked interest in home affairs and the practical side of life.

Also, if the practical work throughout the school course be made to have a direct bearing on cookery and laundry problems, those subjects will not seem so peculiar to the charwoman, but appear as practical applications of many laws established experimentally during school life.

The bestowal of valuable scholarships such as Intermediate County Council, if made to depend on examinations in these subjects, will also hasten the serious study of them.

Even if the time-table and teaching staff of the High Schools could be altered there would still be difficulty in finding practice for the domestic economy class. What is to become of the food? What house is to be directed and kept in order? In every school there is a caretaker, and dinners are provided for scholars coming from a distance. In the Roan School at Greenwich, this work has been given over to

a highly-qualified teacher of cookery, who directs the cookery of the dinners and the cookery classes, and I believe she works the two branches together. It seems to me if this plan were extended, a properly-qualified teacher could find enough work in taking charge of living rooms and offices, and in ordering and cooking dinners, in washing house and table linen of the school, and body linen from pupils' homes, to occupy the time and properly train girls of a High School of about 150 girls.

But, probably, the best solution of the question would be to establish small boarding schools in connection with High Schools, so that girls could pass from one to the other for a short time for their special training.

## TECHNICAL EDUCATION IN RURAL DISTRICTS.

BY THE COUNTESS OF WARWICK.

When the Council of the International Technical Education Congress honoured me with an invitation to read a paper on this particular occasion, I was somewhat at a loss to know what special branch of technical work upon which to touch. As, however, so much of my interest is centred on rural subjects, I decided that my contribution to the Congress should be a short paper on Technical Work in Rural Districts, with special reference to the Technical Education of girls and women, as its careful development may help—not a little—to stay the de-population of our villages.

Starting with the assumption that the Elementary Education Act of 1870 has provided every child with the means of acquiring a knowledge of reading, writing, and arithmetic, the next question is, what scheme of instruction is to follow in order to arouse within the child's mind that interest in things of every day and outside life which will better enable it to understand the technical training that is to follow later. First then and all important to the country child should come the study of Nature—Nature in her many moods and aspects, Nature which surrounds them on all sides, and yet remains to many an unopened book, because their perceptive faculties have never been awakened. An intelligent appreciation of natural phenomena and natural laws when applied to agriculture might go a long way to relieve the depression from which our rural districts are suffering so keenly.

If, therefore, the curriculum of rural schools were made more elastic, the inherent curiosity

of childhood might be turned to better account, and the careful teaching of the rudiments of natural science would provide abundant grounds for legitimate questioning—not to speak of the extreme value of the *mental discipline* which is unconsciously brought into play. Take for example some such suggestive course of graduated instruction as the following.

Commence with object-lessons, giving simple explanations of the simplest natural occurrences, illustrated by constant reference to natural facts. Teach the children such truths as the position of the earth in the solar system, the changes of the seasons, the causes of day and night; and let them *notice for themselves* the different position of the sun at the same hour of the day at different periods of the year; the different aspects of the heavens at different seasons and at different hours of the night. The action of rain and frost and running water should be *shown*, and from it could be built up a sound elementary knowledge of how natural agencies mould the surface of the earth and produce all the varied features in the country around their homes. Instruction should be given as to the names, characters, and structures of the commoner animals, plants, birds and insects which throng the woods, hedgerows, heaths and meadows in the spring and summer; and above all, special stress should be laid upon the sacredness of all forms of life; wanton destruction of flower or insect should be severely condemned. As a learned man has written :—

“Unless for a good reason, such as injuriousness to crops or injury to man, there is no excuse for killing things. A flower growing in its natural position is a source of delight. A flower plucked and thrown aside is wantonly destroyed. Nothing is more lamentable than to see heaps of primroses and hyacinths torn up and flung by the wayside. The primrose is disappearing from the country round the large towns and so are many more of our common flowers. Our rare plants, birds and insects are ‘collected’ to the verge of extermination. It is during childhood that the respect for life can be best indoctrinated, and in teaching elementary science it is possible to insist upon this, and to point out that wilful destruction in any form is an immoral act.”

Before leaving this part of my subject let me touch upon the *quality* of the work done, however simple, however small. If a child can be taught to take a delight and pride in his or her work, to try and excel in accuracy and care in the elementary stages, this will afterwards deepen into personal enthusiasm and interest, which will go very far

to check the terrible apathy and carelessness that arise from work done more or less as a machine instead of by a personally responsible man or woman. Utilitarianism should be kept altogether in the background.

Through the different stages of elementary education the child passes, having assimilated more or less of the instruction offered, if more, technical (including secondary) education will find a soil already prepared on which to sow its seed, if less, the rudiments of knowledge have to be gone over again, with a corresponding loss of time.

The question now arises, which fundamental subjects should be carried to further stages in rural districts? Certainly one should be reading, and

*Reading* cultivated as a means of acquiring knowledge from the accumulated experience of former generations, when books like White's "Natural History of Selborne," Miall's "Round the Year," and others of that character, will help to further develop habits of observation.

*Writing* can be carried on to the cultivation of the expression of ideas (in other words composition and letter-writing), to describing phenomena, and to the orderly keeping of records which should be neatly and legibly written; boys and girls should further be encouraged to keep descriptive diaries.

*Arithmetic* also is of extreme importance, as it will assist in the accurate keeping of accounts. Elementary principles of measurement could be introduced with the study of geometry, and would be of the greatest value to farmers and those who have to do with measurement of land, timber, haystacks, &c.

Local history could be extended into geography and the history of the country.

The elements of the following sciences could also be taught with great advantage to the future farmer or practical agriculturalist :—

1. Chemistry and physics.
2. Geology (for nature of soils, &c.).
3. Botany and zoology.
4. The principles of mechanism for those who have to do with machinery.

Obviously instruction in these subjects is useless unless good and practical, not by blackboard and chalk but by experiment and observation.

The first three sciences would be useful alike to boys and girls, but the last must be for boys only, and if accompanied by workshop practice it would be of great service to them later in life. Boys naturally take to handicrafts, and should be taught the use of tools.

In towns much of this instruction is carried out in the evening continuation schools, but in the country there is no organisation to take this work in hand except the County Councils through their technical education grants, and they are prevented by the Law from expending any of their funds on the teaching of the elementary subjects of reading, writing, and arithmetic. Continuation schools in rural districts are therefore not providing the instruction needed, and it is not to be wondered at that they are in many places showing a considerable falling off. This is very much to be regretted as these could undoubtedly be made to provide exactly the kind of secondary education most needed in rural districts, they in fact provide in many cases the only secondary education available.

Continuation schools provide what we may call secondary education for children who have to leave the elementary school, say, at the age of 13 and to begin work at once. But there is a fair percentage of children whose parents are able and willing to make a sacrifice and to keep them at school for another two or three years, provided suitable means of instruction exist. This leads up to the question of secondary schools. In the towns ample provision in most cases exists for this education, and it is to be hoped that the day is not far distant when such schools will be considerably increased, if indeed there is not one established fairly within reach of all.

Many girls will have to leave the country and take up their residence in towns, and it is most important that they should be well equipped to take their place in the battle of life that lies before them, and the curriculum of their secondary education should include advanced instruction in the three R's, elementary science, French, German, shorthand, type-writing, and book-keeping. This is all the more necessary when we consider the many paths that provide occupations that women may follow in these days.

In the more rural districts, where the percentage of girls who would avail themselves of this class of instruction is necessarily small, the difficulties of the case would, no doubt, best be met by a liberal system of scholarships to be granted by the County Councils. The scholarships should be carefully graded on some such lines as the following:—

1. Scholarships covering fees and travelling expenses at some secondary or higher school for girls, say, between the ages of 13 and 16.

2. Scholarships for girls unable to leave home, entitling the holder to fees and travelling expenses to evening science, art, and technical classes in the nearest towns.
3. Scholarships of higher value to schools of art, science, women's colleges, &c., preparing the candidates for diplomas for teaching, &c.

The subjects of primary and secondary education have been dealt with so far. The former should be so arranged that it will prepare and lead up to the latter. We shall no doubt, some day have a rational system of education, and not a disjointed one, as at present, when due regard will be paid to the co-ordination of subjects of instruction. At present the great want is co-operation in all branches, but this is not likely to be while every branch of education is under a separate and distinct authority, often antagonistic one to the other and encroaching on one another's grounds. In the same town we may see the voluntary schools, board schools, middle schools, grammar schools and technical classes all being carried on under separate authorities who have no regard for each other's work, with the consequent overlapping of each other's efforts in many directions leading to waste of time, money, and energy.

We come now to deal with technical education for women and girls in rural districts. Let us consider for whom this instruction has to be provided. It will be for the wives and daughters of farmers, artisans, and agricultural labourers. Technical instruction is defined to be instruction in the principles of science and art underlying the industries. Now to the class with whom we have to deal perhaps the only industry especially applicable is that of dairying, which is more or less women's work. Beyond this the industry in which most will be engaged is the management of the house, and the proper bringing up of their families. The instruction therefore suitable to the larger class of the women portion of the population in rural districts is that including the domestic subjects—cooking, laundry work, nursing, dressmaking and needlework.

I know it is objected by some that instruction in these subjects cannot be considered technical instruction, and that in some counties a strong feeling exists that, while girls and women have a claim to a share of the technical instruction grants, technical instruction should

only be given to them in secondary and evening continuation schools. It is also pointed out that the funds are placed in the hands of County Councils for the benefit of particular industries and not for any particular section of the population. But I consider that it is of the highest importance to the nation that these women should have the means of learning all that is necessary to become good wives and mothers, and that anything which tends to improve the conditions of the classes in question, either physically, intellectually or morally, is of the greatest service to the country.

The difficulty of providing this instruction is no doubt very great owing to a variety of causes, the apathy of the people, their shyness, and the difficulty of reaching them. The instruction must therefore be taken to them. Obviously the work must be expensive and therefore can only be undertaken by such bodies as the County Councils, and by them through their grants for technical education. It is satisfactory to note that all the counties are providing this instruction in domestic subjects. That their efforts are appreciated, is shown by the attendance at the classes.

In the women's subjects, as mentioned above, the numbers for the counties of Essex and Warwick are :—

*Essex.*

Total attendance at all classes in	
the county .. . . .	20,704
Attendance in domestic subjects	6,062

*Warwick.*

Total attendance .. . . .	10,526
Women's subjects .. . . .	1,617

*Cookery.*—No branch of women's work is more important, but it must be taught on right lines; we shall have achieved a great work when we have taught the wives of the working class the preparation of the many nice and wholesome dishes that lie even within reach of their limited incomes. To do this the following principles should be followed :—

1. To teach the value of economy and cleanliness.
2. To teach principles rather than to give recipes.
3. To teach the nutritive value of different foods.
4. To show that with the exercise of thought diet can be varied at no extra cost.

It is also important that in arranging for the teaching of this subject due regard be had to

the means of the people, to their general lack of utensils, and to the unsuitability of any but the simplest cookery.

*Nursing.*—While it is of the greatest importance to the country that our women and girls should thoroughly understand the proper preparation of food, as bearing on the health of the country, it is also important that they should be taught the proper nursing and care of the sick, and the hygienic principles which should govern the management of their homes. We rightly take the utmost precautions against insanitation, but a good deal of our efforts are neutralised by the ignorance of our housewives of the simplest hygienic laws. The possession of a sound mind generally accompanies a healthy body. To obtain the latter for their children should be the study of the mothers. Our women should be so taught that when sickness comes they would know what to do at the right time, and would so understand the art of nursing as to be able to relieve the sufferer of as much pain as possible. A good nurse is half the battle in a case of sickness, and instances without number could be given where valuable lives have been saved by the care and attention of the nurse. The ideal nurse is one who will faithfully carry out the doctor's orders, and whose knowledge and skill enables her to obey those orders intelligently, and on an emergency to act with promptitude till he arrives.

The organisation of this instruction should be :—

1. Lectures to be given to the women by trained nurses.
2. There should be a county nursing association.
3. Provision should be made for the proper training of these nurses.
4. There should be a certain standard of training for the nurses, and this standard must not be too low.

Having discussed the value of technical training and the selection of various subjects, the next important point is—How is it possible to get the people in rural districts to avail themselves of this education? Neither boys and girls, nor men and women, are likely to learn very much, even if they have sufficient energy to walk some distance to the classes, after a hard day's work in the fields, but surely it would be possible to spare an hour or two every day, or even three days a week, for systematic study. When work is slack much time is wasted in idle gossip; would it not be



better to turn this to account in learning to become better farmers and better cottagers? District technical schools should be opened within given areas, or a technical side to existing schools be developed; or, perhaps, better still, the schools of the whole district should be affiliated, with a technical school attached for the use of the pupils from all. The grouping of districts must be determined by local conditions, and the practical scheme of education must be placed in the hands of a committee, who should leave the carrying out of their work to a competent and carefully-selected head-master. The money received by County Councils for the technical education grant might be well spent in equipping such schools. If a plot of land could be attached to the technical schools, it would be very useful for the purpose of experiment and demonstration in the field. Economy of teaching might be secured by having the same teachers for several schools serving each in turn according to a pre-arranged schedule of attendance. Further details, however, it is unnecessary to discuss in this paper, which aims at suggestions rather than conclusions. I would only emphasize that it is extremely important in planning out both schools and curricula, that everything should be directed towards cultivating plasticity of mind and a power of meeting new conditions and changes in the incidence of competing forces.

The Right Hon. Sir RICHARD PAGET said that the paper teemed with excellent suggestions, so that the difficulty of approaching the subject was increased by the fact that it had been so comprehensively dealt with, and one was at a loss to suggest anything which did not already find a place in Lady Warwick's discourse, in which she seemed to have most completely grappled with the whole subject. What the difficulties of the subject were they knew very well. To put them as briefly as might be they consisted of the difficulty of knowing what to teach, and then how to teach it. One naturally leapt to the conclusion that if those were all, how easy must be the task, but they knew that for the teachers themselves the difficulties were immense in dealing with children who came from different homes. He thought they might congratulate themselves that the nation at large was on the right track. What they had to do was to teach the children to be useful citizens. Their object was to catch them young and train them, and that was being done. The State, as a State, had done that for us. It had determined that education should be compulsory for all, and so one of the difficulties which had existed in past years had been solved. They had

caught the children young, but then came the question as to what they were to teach them. In the rural districts, no doubt, the dairy-maid would always be in request, but if she were a skilled one, and knew the art of dealing with milk so as to make the best butter and cheese, there would never be any difficulty in her finding a situation in which she could make the most of her abilities. But they could not all be dairy-maids. Domestic service, no doubt, would claim a good number of them, and then there was the profession of nursing, to which much importance had very rightly been attached by Lady Warwick. One of the great difficulties was that at present our organizations were not complete. His own opinion was that the development of evening continuation schools afforded the best and simplest way of taking a further step. The county of Somerset was doing a good deal in that direction, for it was spending something like £3,000 out of the total grant of £13,000 to develop the evening continuation schools, and they looked to great good coming from that source. They were easily attended, and the schools could be multiplied to any extent. The work which Lady Warwick invited them to attempt was a work that must commend itself to everybody. It was not too much to say that the future of the nation was in the hands of that generation for which we were asked to do something, and in the various departments of life which lay before the children with whom we had to deal, he was very glad that Lady Warwick did not leave out the duty of the wife and mother, for that was the sphere, after all, to which nature called women, and anything which they could do which would tend to brighten the homes, and increase the happiness and comfort of that class in which they were interested, would be a good work, which, however feebly or imperfectly it were done, would, at least, give them some satisfaction to contemplate.

Mr. JOHN THOMAS hoped that the paper which had just been read to them would be printed and sent to all members of the County Councils. He was a member of the Technical Education Committee of the Bucks. County Council, and their great difficulty was that many of the members of the Council wanted to spend its money in repairing the roads, and they did not seem to think it was a good investment to spend it on education. Until the County Councils were more thoroughly imbued with an appreciation of the importance of technical education, he did not think much advance would be made. And for that reason he would like to see the excellent paper of Lady Warwick printed and sent to all the members of County Councils who had the responsibility of spending money on technical education.

Mr. Alderman T. SNAPE (Liverpool) said that, though the county from which he came was largely and properly regarded as an industrial rather than an agricultural one, yet one third of its area was agricultural, and that part of its area was equal to the whole of

the area of the agricultural county of Cheshire. This was his justification for saying a few words upon the remarkably interesting paper to which they had just listened. He wished first to commend the important suggestion which the paper contained as to the necessity of greater elasticity in the curriculum of our primary schools, and the importance of teaching the causes of natural phenomena. The apathy of the child was thus removed and its interest aroused in the objects by which it was daily surrounded. He thought the most valuable part of the paper was that which suggested that the technical instruction should begin in the primary schools. He hoped very much that the Government would take to heart the suggestions made further on in the paper with reference to secondary education, and especially with reference to the provision to be made for the secondary education of girls by means of scholarships. Under the present law, scholarships were limited to schools where technical instruction was given, but, in the Bill to be submitted to Parliament before the Session closed, he understood that the law would be enlarged so as to enable them to employ their funds in assisting scholars to continue their education in secondary schools of all kinds. Upon the question of nursing, to which Lady Warwick had referred, some of those who attended the important Conference at Stafford-house upon that subject feared that a legal barrier existed against their funds being used for the purpose of training nurses, and for the employment of nurses after training to teach it in the homes of the people. Since then they had given their attention in Lancashire to the subject, and they had found that a scheme could be devised by consent of the Department by which their funds could be employed for the training of nurses. Possibly when they arranged their next year's scholarships some provision in that direction might be made. He wished to add his testimony to the extreme value of the paper, and he hoped, with the gentleman who had last spoken, that it would find its way into the hands of the members of the County Councils of the country.

Mr. R. WADDINGTON, (Vice-President of the National Union of Teachers) wished to also add his testimony to the excellence of the paper which had just been read to them. It was admirably ideal, and if for a moment he desired to bring them back to the real state of the case, he hoped that they would not think he was attempting to disparage its excellence. At the present moment there were over 2,000 schools in their country districts, with an average attendance of less than 40 scholars, controlled by one teacher, and that teacher very often a woman, and there, he ventured to suggest, they did not want elasticity so much as money. Those schools had a Government subsidy of less than a £50 note, with a local authority—where there was a local authority managing the school—bent on saving the School Board rate, and existing only to evade the law. Unless they could imagine a scheme which could

make these schools successful, short of a very much increased subsidy, he had very little hope of Lady Warwick attaining the admirable aims which she had in view. What was the condition of affairs which they had to face? Last year there were just over a million children between 11 and 12 years of age in the primary schools of this country. This year three-fourths of them had disappeared from school life on passing the 4th and 5th Standards. To-day one-half of the children of this country were free on reaching the age of 11 years, and passing the 4th Standard. If they anticipated the realisation of any such grand scheme as that which had been planned out in the paper just read to them, on such a foundation as the 4th Standard, with the probability of a lapse of two or three years, during which a boy or girl would forget the little he or she had learned, they were living in a fool's paradise. Until they had done something—as Mr. Mundella had told them the other day—to carry out the pledge which was made so long ago, and had been almost forgotten; until they did something to take from these small School Boards, which were so closely interested in evading the law, the power to enforce the law; until they were prepared to recognise what every Lancashire millowner would recognise in his business, that a huge school of 500 scholars could not be maintained at the same rate per head as a school of 30 or 40 scholars, they could not hope to bring about any amelioration of the state of affairs in the rural districts. One could not go through the country districts, as he often did, meeting the teachers who were working in the schools and sacrificing their lives in the interests of the children under their charge, without feeling that rural England had made small progress in its industrial occupation. They went from farm to farm, and saw the same implements as those with which our rude forefathers tilled the land, and they had to remember that this state of things was very largely due to the Act of 1870, which gave local option in the enforcement of compulsory attendance to those who were most concerned in evading that Act.

Right Hon. HORACE PLUNKETT, M.P., who was called upon by the Chairman as one who was largely responsible for the interesting Report of the Irish Recess Committee, said that having only just come into the room, and not having heard Lady Warwick's paper, he could not keep strictly to the subject in hand, but he would like to say a few words upon a matter somewhat associated with it—namely, the new policy that they were trying to promote in Ireland. That country, the lives of whose inhabitants were pastoral and agricultural in character, might be regarded as a rural district. There were a growing number in Ireland who thought that the economic question in Ireland (and the Irish question was largely economic) was simply how to improve the conditions of rural life, and to increase the volume of agricultural production. And, as

their Chairman had told them, a body of Irishmen, composed of all political parties, set themselves the task of discovering how countries, similarly situated to Ireland, had raised themselves from a condition of agricultural depression to one of agricultural and even industrial prosperity. After investigating the subject in nine European countries by personal visits on the part of their Commissioners, they came to the conclusion that the case of Ireland was not at all hopeless, and they issued a report, which briefly expressed the conviction that first of all they had to get the people themselves to take an interest in the improvement of their condition, and, secondly (and perhaps this was the most frequent omission in schemes of social and industrial advancement) they had to organise the people. Schemes of social and industrial advancement could not be, in the first instance, promoted by the Government. The people themselves had to be organised, and schemes even of technical education, in their view, ought to be locally initiated, locally controlled, and only supervised, and, of course, to some extent, assisted and directed by the Government. They persuaded the Government to introduce the policy of State-aid to agriculture and industry. They did not ask them in any way to supplant the organisation of the people themselves, and, in fact, they only asked them to supplement their efforts in what they considered to be a perfectly legitimate and yet effective manner. He was sorry to say that, to everybody's surprise, this policy was dropped by the Government in favour of a reform of county government, which was, no doubt, a very admirable thing in itself. They hoped that the other policy would be taken up again, but in the meantime they attached more importance to what they could do for themselves than to what the Government could do for them. They were going to try—and so far as they could without the assistance of the State—to initiate local effort such as he saw, from a cursory glance, was prescribed in Lady Warwick's paper, and they believed that in a short time they would have the ground very well prepared for a scheme of Government assistance, such as was provided in countries like Denmark and Wurtemberg.

Mr. H. MACAN wished to bear testimony to the work of rural education in which the Countess of Warwick had been engaged. He wished Sir Richard Paget had told them at greater length of what was being done in the county of Somersetshire, which had taken the lead in continuation schools. There they had increased by leaps and bounds, and the work had been thoroughly successful, although it was a county which, owing to its prevailing agricultural character, suffered very much from the particular part of the law mentioned by Lady Warwick. But he ventured to suggest that the particular clause in the Act of Parliament did not, in a large number of our rural districts, operate adversely in the promotion of evening continuation schools. Having been concerned himself in the establishment of 70 such schools—three-quarters

of which were in rural districts—he had found that taking away all the elementary education which ought to have been given in the elementary schools assisted in the development of those schools, and he had found that introducing into them the hereustic system advocated by Dr. Armstrong had the strongest effect in increasing the attendance of the boys. If any of the foreign visitors were interested in the matter they could see, not a hundred miles from London, 350 plots, attached to continuation schools, under cultivation by the pupils, under the guidance of an inspector, who travelled from one to the other, and in the winter months they could see the boys undergoing agricultural and horticultural instruction, and the general study of nature, which Lady Warwick had so well advocated. The education of the girls was very much more difficult than that of the boys in the evening continuation schools, and he could bear out what Lady Warwick had said as to the very great difficulty they had had in getting hold of the girls. The difficulties were not so much educational, as those arising from matters of home-life, and partly from social reasons, and he thought that some new development of policy on the part of the Education Department, in encouraging something like the day continuation schools, would be necessary before they could succeed in getting hold of the girls to the same extent as the boys.

Dr. RYAN (University College, Bristol) said his only reason for intervening in the debate was that he took great interest in agricultural work. The Countess had drawn attention to an urgent need, and had advocated it very ably. Technical education was too often associated with a repulsive and uninviting room, called a laboratory. It was a pity that those who spent the early part of their lives in the laboratory of nature should lose its advantages for the lack of organised help. It was strange, and at the same time, sad, to find young men who had spent 15 years in the country coming to college totally ignorant of the very simplest principles of physiography or physical geography. There was no reason why a country boy should be less observant than a town boy. In particular he advocated the teaching of mechanics in view of the extensive applications of machinery in agriculture.

The Rev. R. C. FLETCHER (Lancashire County Council) said that his experience of technical education in rural districts, which had been not inconsiderable, led him to the conclusion that one thing which they had suffered from very much, and which had left its mark behind—a mark that it would take a long time to wipe out—was the inefficiency of the teachers who, at the beginning, undertook to carry out the work. It was found at the commencement that every elementary schoolmaster, after about 24 hours' notice, thought himself qualified to teach agriculture to farmers and others who had devoted a lifetime to the practical study of the subject, and though

their inability was soon found out, it left a bad name behind, and technical education was in rural districts looked upon as a sham. And then, too, there was some difficulty amongst those who had to be taught. In his district a chorus of indignation arose as soon as cookery was mentioned, and there was a cry that it was insulting to suggest they did not know their own domestic duties. But these prejudices had been gradually overcome, and he had found that that teaching had been most successful which involved demonstrations of fact by means of things to be seen and handled. One subject which they had found to be very popular was that of ambulance work and sick nursing, and the difficulty at first anticipated, of teaching the subject before a mixed audience, was got over by dividing each lesson into three parts, and giving first half-an-hour to male students, then an hour to a general class of both sexes, and finally half-an-hour to female students; thus avoiding the treatment of delicate subjects before a mixed audience. No knowledge was more urgently required now in the rural districts than that of elementary care and precaution in the sick room, and when one saw the unnecessary pain to which a sick person was subjected through general ignorance on the part of their friends, the necessity of further instruction became painfully evident. The rural people wanted to be taught a little more of the decencies of life, to be taught lessons of refinement and thoughtfulness, and not a little of that practical gentleness which was so essential to the comfort of the sick. As to the lack of elasticity in our elementary education, the Education Department was entirely responsible. The Code was provided and the teacher absolutely tied down to it.

Mr. MAURICE JACOBS (Bucks) wished to say a word of thanks to the Countess of Warwick, not only because of the intrinsic merit of her paper, but also because he believed, or, at least, hoped, that it would be the means of drawing a little more attention in the Press to the needs of the rural districts. In his own district—Mid-Bucks—they had few continuation schools, but the Technical Education Board devoted a great part of its income, with a fair measure of success, to domesticating the women so that they might be able to make the most of their husbands' slender earnings. Health missionaries had been much appreciated, and he hoped to induce his Board to extend the system to other subjects and send out cooking and needlework missionaries to the houses of such of the working-classes as would welcome them. The funds at their disposal were very inadequate for the needs of a great county, and he hoped that their work might be inspected from time to time and receive from Government a large grant.

Mr. HENRY ACKERLEY (Wigan), although quite admitting the marked ability of the paper, could not agree with it on general principles. Mr. Snape had indicated the difficulty of interesting people in technical instruction matters in the counties. Why?

Because it was undoubtedly thought that the instruction given was not of a practical character. What was the money to be used for which at present they were spending on technical education? Generally speaking, he understood it to be that we might be enabled in our trade and commerce to contend successfully with the competition of our rivals abroad, and the reason why there had been such little interest taken in technical instruction in agricultural districts was that it led to no practical results. The money given by the Government was for the purpose of making better craftsmen, and making a man proud to get his living with his coat off, rather than with his coat on.

Mrs. PILLOW (Ladies' Technical Committee, Norwich) said that when they got one central authority to act as an Education Department—right through from the infant school to the university—they would have a graduated system of instruction which would include elementary, secondary, technical, literary, and the higher branches of education altogether. One word as to teaching in rural districts. They had not aimed at securing that which the last speaker had lamented had been omitted from Lady Warwick's paper—How to reduce the price of produce. On the contrary, they had, by teaching butter-making, enabled the farmers to increase the price of their produce, and to sell their butter at a penny or two-pence more a pound. That, at least, was a practical result of the education given.

Mr. R. P. WARD (Cheshire County Council) said the Countess of Warwick had laid special stress upon the training of young women in domestic housework. He would like to draw the attention of the meeting to what was done in his county to give practical effect to the suggestions made. A number of scholarships were granted for training in domestic work at the Institute, Worleston. The students were over 16 years of age, and during the morning some were instructed in butter-making, whilst others were taken into the kitchen, under the supervision of the matron, and the work to be done there was divided amongst them; and in the afternoon a trained and experienced teacher gave instruction in laundry work, cookery, the cutting out of garments, sewing, &c. A trained nurse attended once a week to give two hours' instruction in the nursing of the sick. Great interest was taken in the work, and the scholarships awarded were eagerly sought after. At the end of ten weeks an experienced married lady undertook a thorough examination of the students in all the branches of work. The whole scheme had been remarkably successful.

The CHAIRMAN said he appreciated fully the remarkable breadth and liberality of Lady Warwick's paper. It was a charming paper, and one that would repay careful and sympathetic perusal, and he only wished that all the ladies of her rank and station would take the same liberal and enlightened views of

education that she had shown. The paper was so full of suggestions that it was almost impossible to comment upon it. It involved in the first place an educational reform of the very highest importance—that is, that there should be in each district one authority, one public authority, to which shall be entrusted the whole educational work of the district. Now, before saying a word in detail, he must call attention to the statement that has been made by Mr. Waddington, of Bolton. He spoke of the short time that the children attend school, and of the impossibility of crowding into their infant minds all the knowledge that the British public required them to possess. Well, he fully agreed with him. Our whole educational system up to now had been, to use a homely expression, trying to put a quart into a pint pot. It is impossible if children are to be taken from school at eleven years of age—and many of them leave school earlier than eleven years of age—that they can derive any advantage from their education, or can turn it to practical account in their future life. He knew that in some of the rural districts there are some admirable schools. He knew a district, purely agricultural, where Lady Warwick's ideals are almost realised. The school is entirely managed by a lady who devoted her life to it, and the teaching of that school is of a most admirable character. He discovered it when he was Vice-President of the Council, and he had followed it up since. There is no better school in England, but it is all due to the wisdom, the intelligence, the application, and the sacrifice of one lady. The result was that the children did not come out of that school when they reached the age of 13 or 14, and the parents were beginning to see the advantage of keeping them there; and the boys know the use of the pencil, and they go to the garden and green-houses and make drawings of the improvements they want to make, prepare designs for the laying out of garden plots, are carpenters and builders, and they have a general mechanical knowledge. The girls are taught excellent practical cookery. It is simply a revolution that has been worked there by having a really excellent practical school, with practical teaching. Our urban districts are improving in education greatly, but there is much to be done in the rural districts. During the present year he had visited friends in the country, and a schoolmaster said to him one Sunday afternoon, "I assure you that the whole object of the school attendance committee in my district is to turn every school into an infant school." What can the poor schoolmaster hope to do under those discouraging circumstances? And what a national disgrace it is that such a state of affairs should be allowed to continue! No child should be employed without a certificate that he or she has passed a certain standard and gone through a certain curriculum, and then we should feed the continuation schools, which would carry all the boys and girls up to 17 and 18 years, and it should be obligatory upon them that they should attend so many times a year until

their education is practically completed. What a revelation, for instance, Denmark offers to our agriculturalists! What a puzzler it is to them! A country with worse soil than ours, with most severe winters, where they have the greatest difficulties of nature to contend with, and where they have absolute free trade in agriculture; and yet—these people, through intelligent teaching, and co-operation, and that organisation to which Mr. Plunkett has referred—these people are sending us ten millions worth a year of agricultural and dairy produce, flooding the country with it, and it fetches the highest price that can be obtained throughout the length and breadth of the land. It is a fact that we are receiving every week of our lives, every day of the year, £10,000 worth of Danish butter. What an extraordinary fact it is that we should be bringing these enormous quantities from foreign countries when our climate is so well adapted for dairy produce and we ought, and are able, to supply them to ourselves! Let us try what we can do to make our own children as intelligent, as thrifty, as productive as the people of other countries, who are such reproachful examples to us.

Lady WARWICK said she was glad to hear the remarks from Mrs. Pillow, because the women of the eastern counties feel deeply what an important question this is. Referring to the school mentioned by Mr. Mundella, Lady Warwick said she hoped to emulate that lady by the little school of her own—a continuation day school for boys and girls—in the remotest part of Essex, where it was utterly impossible for the County Council evening classes to be of any good at all. It was an experiment which started in February with two scholars. They are increasing every day, and next year she hoped to have 200 at least. The County Council had approved her efforts, but cannot help her, because these day continuation schools do not find favour with them. But the whole question is what is to be done with children who, at the age of 13 years, at the most critical time of their lives, are thrown out upon the world forgetting all they have learned in the elementary schools.

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## TECHNICAL EDUCATION IN SECONDARY SCHOOLS.

BY MISS FANNY L. CALDER,

Hon. Sec. Liverpool Technical College for Women.

Amongst the educational developments which form such a distinguishing feature of this last quarter of the 19th century, none, perhaps is more remarkable than the acceptance by the recent Royal Commission on Secondary Education of "Domestic Science" as a branch of secondary education. Certainly nothing shows more completely how public opinion in England can be revolutionised, when

persistently "instructed" as to the needs of the generation. No doubt English educationalists have been woefully backward in recognising the necessity of educating "the maker of the home" in the duties of her calling, but when at last the need was seen and acknowledged, the organisation of well conceived plans and methods progressed rapidly, and the present position of home-lore in England is behind that of no other country in efficiency and completeness. Two main hindrances had to be overcome in accomplishing this end. First, the idea engrained in men's minds that all women understand by nature the duties of home-life, that because a mother *ought* to know how to manage her home, therefore she *does* know, and consequently that to attempt to teach such every day details is a pure work of supererogation, and a waste of time and money. The second hindrance was based on narrow prejudice, and, therefore, more difficult to deal with. It was loudly and scornfully contended that to introduce into the educational system of the country the practical teaching of subjects relating to woman's special work, the management of the home, was a degradation of education itself, was placing girls in an inferior position to boys, and wasting the precious hours of school life, which ought to be devoted entirely to book-learning.

It was not until philanthropists and other leaders of public welfare awoke to the fact, that a vast economic loss was entailed upon the nation through the ignorance of its women of the most elementary principles of thrift and management, that the force of these objections was gradually withdrawn and opposition changed into hearty and substantial co-operation.

It was Dr. Samuel Smiles who pointed out that "from want of culinary skill English people waste as much food as would feed another nation," and, yet, in the great educational scheme of 1870 no one dreamt of trying to rectify this evil.

It was the Royal Commission on Elementary Education of 1887 which laid down the principle "that the true object of education is to give such instruction to the scholars as will best fit them to fulfil the ordinary duties of the life to which they are most likely to be called," and "to encourage such training in school in matters affecting their daily life as may help to improve and raise the character of their homes."

But the main factor in bringing about that

complete change of front, which is so striking in the educational programme of the last ten years, was the steady, persistent effort on the part of educationalists connected with various schools of cookery to prove to the public the possibility of domestic subjects of every kind being taught in classes, on true educational lines, and with all the methods and accuracy of science.

Personal acquaintance with the general life of the people had plainly demonstrated to the committees of such schools that ignorance of all that goes to make up the comfort of a home was at the root of much that debased and impoverished the nation, and that nothing would help so much to raise the tone of domestic life as to educate *all* women and girls in the useful detail of daily duties, and not merely those for whom such work was to become a profession. Practical education was a great national want.

Beginning, therefore, with cookery as the first necessity of a household, systematic courses of lessons were thoroughly elaborated, combining principles with practice, and suitable in details to the varied requirements of the different classes that would take advantage of them. One by one the sister subjects of laundry-work, household sewing, home dressmaking, and domestic millinery, were worked out on the same lines, accompanied in each case by the syllabuses, recipes, and manuals necessary to render the instruction educationally complete.

The result of these efforts fully justified the term of "domestic science" as applied to such practical subjects when organised as education, and prepared the way for their subsequent adoption as a suitable form of "technical education" for women. Of course the training of teachers in all these branches went hand in hand with their progressive development, and the establishment of technical colleges for women was a consequent duty entailed upon the initiators of this movement.

Between the years 1876-1890 such of the domestic sciences as had then been formulated and recognised by Government were only taught in elementary and in evening continuation schools, and the path of progress was blocked by the fact that the time-tables of these schools were already overweighted and nothing more could by any possibility be crowded into them. After 1890, the time when public zeal was thoroughly aroused as to the necessity of organising special technical education for men and boys, came the longed-for opportunity of finding the suitable position in national

education for the special subjects required for women and girls. As "secondary education," and upon the completion of the years of elementary school life, time could be more completely and satisfactorily given up to the study and practice of domestic science, and an often-felt gap between the time of leaving the ordinary school and the entrance upon the duties of girls' respective callings be filled up. Thanks to the public spirit of those who formed the first County Councils and had to deal with grants of money set apart for the purpose of promoting technical education, this opportunity was pretty generally recognised, and agreed to when appealed for by those who led the way in all these organisations. Classes were established all over the country, for women and girls, in the specially womanly subjects of cookery, laundry work, household sewing, home dressmaking, and hygiene. Let it be thoroughly understood that these classes were by no means *professional*, but were arranged entirely with the view of improving the home life of the people. The value of these classes went far beyond the immediate result upon individual learners, they acted as educators of public opinion, and as object-lessons to all concerned in the welfare of the nation and the promotion of education, by showing the necessary lines upon which girls' education needed to be conducted, if our women were to be found equal to those of other countries in the knowledge and practice of home-lore.

Through such definitely organised instruction it was seen how education was ennobled, *not degraded*, by its application to the art of "spending" as well as to that of "earning." "*Domestic science*" no longer needed the apologists, who for years had to fight even for the terms in which the "new learning" might be expressed, but as "secondary education" became a needed and recognised branch in the Code of public education, and is now rapidly developing upon two distinct lines, either as a domestic science side of the usual secondary school, or, as a "secondary school of domestic science" only. By adopting these two methods of working, technical education is brought within the reach of all the different sections of the community. To girls who are able to prolong their education and remain up to 17 or 18 years of age in secondary or intermediate school, these technical branches can be taught gradually, and mostly during the later years of school attendance. For example several intermediate schools opened

in Wales, under the recent Intermediate Education Act, have introduced technical subjects side by side with the usual literary branches, and domestic science takes its place in the daily time-table, as any other science might do. And this method is being increasingly adopted in all directions. On the other hand, for girls, whose education cannot be very prolonged by reason of their calls to work either at home or in some remunerative employment, a more concentrated system is necessary, and "schools for secondary education in domestic science" only, have been established. Here the whole series of domestic subjects is included in the course of about six months' duration, and the curriculum comprises only, or mainly, the practical subjects named before as the necessary equipment of a housewife, viz., cookery, laundry work, household sewing, home dressmaking, domestic millinery, and hygiene; *with the addition* of general "housewifery;" and in the most complete schools this last is taught by practice in a house in *permanent occupation as a residence*, so that the instruction may be thoroughly applicable at home, and not be learnt by theory, or on diminutive specimens of house gear. These schools are open to any girl, and are attended day by day from 9.30 to 4.30, like any other day-school.

On these lines the Liverpool Technical College for Women is working the scheme of "Secondary Education in Domestic Science."

The several subjects work simultaneously and are taken by different classes in turn for a week at a time, so that no one branch becomes monotonous or detrimental to health. By the end of a course every girl has had several weeks in each branch, each return showing the increased intelligence developed by the variation of the work.

The literature of these sciences is also a valuable and most useful accompaniment. Accurate and simple penny manuals for scholars have been published as each branch was developed, and have doubled the benefits to be derived from the instruction given in the classes by thus providing really suitable and inexpensive books for home reference.

Technical and other committees are now offering scholarships, to be held at these domestic science centres, which include free education, meals on school-days, and the materials required for making up the various articles in the sewing, dressmaking, and millinery classes.

Some of these scholarships are given for a second course only, as in Liverpool by the Liverpool Council of Education, in order to prolong the instruction from six to twelve months, the length of time to which "a counsel of perfection" would extend every course.

In some counties hostels are provided, and board and lodging are given with the scholarship, but this is chiefly in smaller towns where the scholars are drawn from distant villages or remote hamlets and in consequence could not manage a daily attendance. Such a school is working at Worthing in West Sussex.

The position Technical Education has now attained is this: first, the establishment of technical education in domestic science for girls in secondary schools of one kind or another all about the country, open to all, so that any girl may have the opportunity of learning at a very small cost all the practical sciences which comprise the everyday duties of the housewife; and, further, that the educational value of methods by which head and hands work together, without the sacrifice of one to the other, is fully recognised and accepted whenever and wherever new educational schemes for girls are under consideration.

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NOTE.—In the Victorian Era Exhibition at Earl's Court, in the Education Section of the Women's Department, the Liverpool Technical College for Women has an exhibit of "The Development of Domestic Science Education in England, 1837-1897." The exhibit is 15 ft. along the wall, and shows the subject under three headings, "Elementary, Technical, and Secondary." Photographs of students at work in all the branches, syllabuses, manuals, and sketches depict the system pursued by the Liverpool Technical College for Women.

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## HISTORY OF TRAINING SCHOOLS FOR TEACHERS OF DOMESTIC ECONOMY IN ENGLAND.

BY MISS PYCROFT.

Organiser of Domestic Economy Classes, Technical Education Board, London County Council.

In a gallery of the Bethnal-green Museum, in the East of London, out of the way of most visitors and known to a very small proportion of the inhabitants, there is a collection of food stuffs, made as long ago as 1857, since added to from time to time and re-arranged. To this collection, apparently so unimportant, is to be traced the origin of the great movement in favour of the teaching of cookery, and consequently of other branches of domestic economy, that has gone on for the past 25 years and is still spreading throughout this

country. The idea of making a collection of food stuffs had occurred first to Mr. Twining, of Twickenham, who made such a collection for a private museum. But the food stuffs at Bethnal-green were collected for the Science and Art Department by Lord Playfair, Dr. Lankester, and Mr. Buckmaster, and were at first housed in the museum at South Kensington. Thus the Science and Art Department may claim the credit of having sown the seed of the great movement which followed, though its development was due to other agencies.

It was proposed by some members of the Commission of the International Exhibition in 1873 to show there samples of food and food-stuffs, with the view presumably of interesting the public in little known articles of food and encouraging their importation, and it occurred to Mr. (later Sir Henry) Cole, who was a member of that Commission and also of the Science and Art Department (but who in this case acted in his capacity of commissioner only) that, while a collection of food and food materials would excite little interest and would be for the most part unnoticed by the crowds of visitors at the Exhibition, lectures on food accompanied by practical demonstrations of cookery would, from their novelty, attract a large amount of public attention. It was difficult to determine how the mixed lectures and demonstrations should be worked, but it was decided to ask Mr. Buckmaster, who had already studied the composition of food-stuffs and helped to collect them for the Science and Art Department, to deliver the lectures, and he has described to me how he was sent for and asked at three weeks' notice to undertake the work, and he has told me also of his dislike of the task and his despair of obtaining all the necessary information in the small time at his disposal. The books in existence did not give him the facts he wanted, for the science was new, the composition of food-stuffs and their work in the body was even more imperfectly understood than it is now, and the chemistry of cookery presented still more unsolved mysteries; and, moreover, he knew nothing of practical cookery. However, the work had to be attempted. The practical part was arranged under the management of a French chef, with four women doing the actual work under his guidance, all four performing the same operations simultaneously at different parts of a counter stretched across a wide hall, while Mr. Buckmaster lectured from a sort of rostrum near at hand; lectured twice a day from May to November, working up his lectures



between whiles, seeing new facts, discovering new reasons for them, feeling more and more at home in his subject as the time went on. And the event proved that Sir Henry Cole was right, the lectures attracted a constant stream of visitors, chiefly of the upper and upper middle-classes, and great public interest was excited in the subject.

From that time Mr. Buckmaster was constantly appealed to from all parts of the country to give lectures on food, with cooks demonstrating under his directions. The idea took firm hold; philanthropic women, realising the immense advantage which a knowledge of cookery would be to their poorer neighbours, started cookery lectures for the poor as well as for the rich. The very first cookery lessons had indeed been given in Wakefield Vicarage in November, 1872, where a professional cook was engaged to give instruction in high class cookery in the mornings, and, in the evenings, lessons in economical cookery to a certain number of school girls, ladies being present at all these meetings to see that everything was made clear to the pupils, and to look after the general management. But after the exhibition of 1873, cookery lessons were arranged in several of the northern towns, and in London a number of influential people, whose attention and interest had been aroused by the exhibition lectures, formed themselves into a committee with the Duke of Westminster at their head, to consider how the desired object of establishing a centre for cookery teaching on a permanent basis could be attained. The result was the foundation at South Kensington in 1874 of the National Training School of Cookery. Here under the management at first of Lady Barker, and in premises lent by the Science and Art Department, cookery lessons were given to numbers of wealthy people. For a time it was the fashionable thing to take a course of cookery lessons, and the object for which the school was founded lay more or less in abeyance,—that namely of supplying instruction to the poorer classes, who, it was felt, suffered much in health and comfort for want of a knowledge of the elementary rules of cookery and of the value of different kinds of food. The courses of lessons given in the first year seem odd enough now. They consisted solely of practice lessons in scullery work and in peeling and cooking potatoes, in the mornings, and of demonstration lessons in cookery, in the afternoons. Pupils entered for ten days' courses of this kind of instruction. The teaching was of course given by cooks; no trained teachers of cookery

existed as yet, but it soon became evident that teachers of a higher type than the professional cook were needed if the principles of cookery were to be fitly taught, and that to engage a scientific man to lecture while the cooking was done by others was an expensive mode of obtaining instruction and not in every way the best. A demand for a different kind of teacher and different methods of teaching arose, and in the next year when Mrs. Clarke, the present lady superintendent of the school, began her work, two new developments took place, one the opening of a practice kitchen for what is technically termed artisan cookery, and soon after, the opening of a training school for teachers of cookery, teachers who should be instructed in the theory and should be prepared also to teach it practically. The course of training occupied but two months, only one paper was set by way of written examination, and diplomas were issued on the strength of that paper and of an examination in teaching cookery by demonstration. The written examination papers were, however, examined by a very competent authority, the late Dr. Hans Busk. It seems curious now, when the length of training is at least quadrupled, that anyone should have imagined such a training and such an examination to be sufficient—all the more curious when we consider that the movement had been started by scientific men, who, from the first, must have realised the amount of accurate knowledge required by those who were to attempt an explanation of the changes that take place during the various processes of cookery and the reasons for those processes. However, so it was, and in the first year ten students received their diplomas as teachers of cookery, several of these being women sent up for training from Liverpool, Edinburgh, Leeds, Birmingham, and other towns, where it was intended to establish cookery schools. The next year, 1876, thirty-nine teachers were trained; and in this year also a great step was taken in the foundation of other training schools for teachers of cookery. It was felt by committees working in towns in the North of England, that as the work grew, and they had faith that it would grow, a large number of teachers would be needed, and that the expense of sending many teachers from distant parts of England, and even Scotland, to be trained in London would be greater than could be met, and they therefore called a conference which met in Liverpool in the same year, 1876, to discuss the question of forming a union to examine and

grant diplomas to students in other training schools for teachers of cookery.

A proposal was made to the National Training School of Cookery that it should act as a university and send out examination papers and issue diplomas to provincial schools, but the committee answered that their constitution did not enable them to agree to the proposal. They felt, it seems, that it was unnecessary for the sake of the work to open any other training school than that at South Kensington, and that the whole work of training could be done in London.

The schools which were represented at the Conference were those of Liverpool, Glasgow, and Yorkshire (where schools had been established in the towns of York, Leeds and Wakefield), and these schools agreed to form themselves into a Union for the training of cookery teachers, and to grant diplomas on the result of training given on prescribed lines, and of examinations conducted, as regards written examinations, by one examiner for all schools, and as regards practical examinations, by the committees of the various schools on lines laid down by the Union. The title adopted was, by reason of the situation of the original schools, the "Northern Union of Schools of Cookery," and under this title, the band of schools worked for many years, having a very important and distinct influence on the teaching of cookery. Other schools joined the Union as time went on, the school at Leicester being formed in 1877 and taking its first teacher from the training school at Leeds, where at this time the term of training was three months, showing that the need for longer instruction for teachers was already making itself felt. Occasionally a school left the Union (as in the case of Leicester, which now runs independently as the North Midland School of Cookery) but the number in the Union increased, till some eight years ago, seeing that the old title no longer corresponded to the area covered by the schools in the Union, nor described the full extent of its work, this title was changed to that of "National Union for the Technical Education of Women in the Domestic Sciences." At the present time there are eleven training schools working under its auspices.

But from 1876 to 1889 is a long leap and the intervening time had brought many changes and a great advance in modes of training.

The Northern schools felt almost immediately their work began that if a knowledge of cookery and of food materials were to touch the poorer

classes and influence their modes of living, instruction in the subject must be given to the children, and though this could be done on a small scale by voluntary agencies, it could only be done permanently, and on a large scale, if the subject were recognised by the Education Department as one for which grants could be earned; it had already in 1874 been recognised as one which might be taught in elementary schools. The ladies at the head of the movement in the Northern Union decided therefore in 1877 to present a memorial to the Education Department, begging for a grant on cookery lessons to school children; the desirability of the appointment of an inspectress of cookery was also discussed by the Union, and pressed for by its hon. sec. The Department finally acceded to the request, and a grant for the teaching of cookery was made in 1882. It was a matter of course that, as soon as the subject was admitted into elementary schools, the Education Department, since it did not itself propose to undertake the work of training teachers of cookery, should have the right of accepting or refusing to recognise the diplomas issued to the teachers by various training schools. The National Training School of Cookery and the schools of the Northern Union, which had drawn up and presented for approval syllabuses of lessons to school children, were at once recognised as schools approved by the Department, and a few others soon obtained recognition. For a time, in order to meet the demand for cookery teachers in country districts, a lower class of diplomas, called local diplomas, was granted after short courses of instruction or examination in cookery to teachers in elementary schools, and these were recognised by the Department; it being considered that the small knowledge of cookery professed by the holders of these local diplomas was counterbalanced by the skill in teaching which the trained teacher possessed, for the cookery schools, though they had improved their training slowly yet surely, had not yet given their students much training in the art of teaching. Classes of children attended at the training schools and served as practising classes for the students, who were also sent out to school and evening classes as opportunity occurred, but no definite provision for training in educational methods was made; however, the better schools worked steadily onward increasing the length of training and adding fresh subjects, increasing also the thoroughness of the examination on

which the granting of the diplomas depended. Lessons on school method were given in some schools, but the value of the training and the final test examination varied largely.

Meanwhile, owing again to the initiative of the schools of the Northern Union, it had been impressed, by a deputation from these schools, upon the Education Department that lessons in laundrywork would be only less valuable than those in cookery to the pupils in elementary schools. The honorary secretary of the Union, Miss F. L. Calder, had drawn up a syllabus showing how such a novel subject of instruction should be handled, and in 1890 a grant was made by the Department for lessons given in laundry-work to school children. There was, therefore, now a second branch of domestic economy for which special teachers were required, and some of the training schools of cookery began at once to make arrangements for training students in laundry-work. The National Training School of Cookery did not for several years see its way to provide training in any subject but cookery. The Northern towns, therefore, led the way, and it was about this period that they changed their title, as previously stated. The Education Department had now an interest in, and influence on, two branches of practical instruction in domestic economy, and it soon took steps to regulate the time of training and to secure for the students adequate practice in teaching classes of children. In April, 1893, the circular, well known in all cookery schools as "Circular 317," was issued, requiring all schools which wished their diplomas to be recognised by the Department as qualifying their holders to teach in elementary schools to provide as a minimum period of training:—  
 20 hours a week for 6 months for a cookery certificate,  
 " " " " 3 " " " laundrywork "  
 and to see that in the case of cookery teachers one month, and in the case of laundry teachers three weeks, should be given to teaching classes of children under proper supervision. The circular also withdrew the sanction of the Education Department from the lower class diplomas, called Local Diplomas or Teachers' Licenses, the duration of which had previously (1891) been limited to a period of three years, after which time the holder must bere-examined; but elementary school-mistresses were still allowed to teach cookery to children in their own schools after a course of not less than two months' training. This circular did much good in raising and making more uniform the standard of training; it was thought at first

that it would have the effect of killing off some of the smaller and less efficient schools, for increased training meant of course increased fees, and increased fees might mean a diminished number of candidates for training. But another force had been at work in stimulating the energies and widening the sphere of the training schools. The Customs and Excise Act of 1890 had put a large amount of money at the disposal of the County Councils all over the kingdom for the purpose of technical education; and the various branches of domestic economy and the training of teachers in these branches were recognised as some of the subjects which might be aided from these funds. Many classes in cookery were started. The demand for teachers was at first larger than could be supplied, and for a time very large salaries were paid for their services. The natural result was a rush of students to the training schools, but many of these not being persons really fitted for the profession, failed to give satisfaction to their employers, and partly from this reason, and partly from a natural desire to show themselves as capable of training teachers as their neighbours, of providing instruction "made on our own lines, gentlemen, and guaranteed the best," many towns and counties opened training schools, and these were, almost without exception, aided by public funds, and, therefore, escaped the difficulties which had beset almost all the other schools in a struggle, sometimes seeming almost desperate, to make receipts and expenditure balance. Some of these new training schools joined the National Union, others ran on an independent basis. The schools at Gloucester, Bath, and Bristol, are instances of the first, the schools at Cardiff, Norwich, Newcastle-upon-Tyne, and, in London, the Lambeth School (founded by means of a grant from the Berridge Trust, and not with County Council money, with the express object of training teachers for elementary schools connected with the Church of England), and the school at the Battersea Polytechnic, mainly supported by the County Council, are instances of the second. A tremendous impetus had been given to technical education by the Customs and Excise Act; many of the old schools as well as the new, now received help from their County or Borough Councils; and, more than this, better ideas of technical education were in the air, so that the training was improved on all sides. The minimum term of training prescribed by the Education Department, and which

applied to teaching in plain cookery only, though in almost all cookery schools the higher branches were also taught, was soon exceeded, and new branches of domestic economy, comprising needlework, dressmaking, millinery, and housewifery were added, so that now almost all subjects which can be included under the term "domestic economy" are taught in the majority of training schools. Moreover the impossibility of teaching such a subject as chemistry from text-books or by lectures unaccompanied by practical work is being more and more realised. Some schools, unable to supply laboratories for the use of their students, now arrange chemical lessons for them outside their own walls. At Battersea, the only school of which I know that has this advantage, regular and special courses of lectures and practice lessons in chemistry are given to the students of cookery and laundry-work, and here also, for the first time, a permanent mistress of method has been appointed to train the students regularly in educational theory and practice. In all the 30 schools of cookery and laundry-work at present recognised by the Education Department there is still doubtless room for much improvement, but happily those who have to do with managing the schools are bent on improving them still further. The one great want at present is uniformity of examination, and consequently of a standard in the diplomas issued. Various attempts have been made to attain this since the first attempt failed in 1876, but none have succeeded, diversity of opinion and the love of each school for its own ways having hitherto proved too great; but many are agreed now that the Education Department is the right authority to deal with the question, and are looking forward to the action which will, they hope, be taken by that body in the near future, with regard to the subjects of cookery and laundrywork, if not of all branches of domestic economy, and which, while leaving to each school freedom of initiative and experiment in many ways, will yet maintain a just and equal standard of examination in all.

The history of the schools which I have given so imperfectly is one of 25 years, years in which huge growth has been made by education in many countries, but in whatever direction this growth has taken place, there is none, I think, which should be of more permanent benefit to the community than that of bringing scientific knowledge and accuracy and intelligent thought to bear on the ordinary and everyday work of our home lives. All honour to

the originator of that little collection at Bethnal-green, the yet unexhausted seed of so great a family of plants.

## TREATMENT OF DOMESTIC SCIENCE AS AN ELEMENT IN GIRLS' EDUCATION.

By MISS L. EDNA WALTER, B.Sc.

At a time when the domestic education of women is considered worthy of ranking as technical education it is wise to consider how its standard may be raised, and how it can best be instilled.

Domestic work will never be regarded as in any way comparable with professional work unless it rest upon some surer foundation than rule of thumb. If there is any work which is a direct and easy application of simple scientific facts, that work is the daily routine of an ordinary house. The simplest of chemical facts manifests itself at every fire, and the simplest of physical laws regulates the hot water upstairs. If only this were realised by everyone, and girls' education modified accordingly, we should have household work much more easy and pleasant to everyone, with possibilities of greater variety and less conventionality in arrangement, and probabilities of fewer burnt saucepans, badly laid fires, ill ventilated rooms, and undrinkable tea. In spite of a generally prevalent opinion to the contrary the universe has not arranged itself so that one set of chemical laws obtains in the laboratory, and another in the kitchen; there is only one chemistry, so that that must be *the* chemistry wanted in the household. For the sake of those who are afraid of the words "chemistry" and "physics" in connection with women's work, I hasten to add that the amount required is not very great, and ought to be learnt at school. The more these subjects are studied the higher will be the recognised position of domestic work. But however desirable it may be to raise the professional standard of domestic economy among women of ordinary culture, it is still more imperative that whatever part of it is taught to the girls in the elementary schools should be so taught that they may derive the greatest possible educational benefit therefrom.

A movement, led by Dr. Armstrong, has been on foot for some years to teach fundamental science in a sensible way. Adopted with

greater readiness in some boys' schools, both secondary and elementary, it has obtained a footing which time will strengthen and success secure. More slowly is it finding its way into the privileged precincts of girls' schools, but a victory was won when, after several years of steady perseverance and patience on Mr. Heller's part, his scheme for a scientific course for girls was accepted by the London School Board and incorporated in the Code. The syllabus occurs under the title of "Domestic Science," and is taught actually in the schools by the class teachers acting under Mr. Heller's guidance. It is being suggested that the domestic science should be placed in the hands of the teachers of domestic art—*i.e.*, into the hands of the instructors of housewifery, cookery, and laundry work. Whether it is better that the class teachers should do the work, or that it should be in the hands of a specialist is obviously a matter open to discussion. I do not intend to go into that matter now, but wish to place before you my view on the subject of the mental equipment of these teachers of cookery, &c., if they are required to teach the science at all. I think it will be well if I briefly outline what I mean by domestic science and what by domestic art. Under domestic science I should include measurements of area, volume, weight, and density; the last exemplified in any hot-water circulation or system of ventilation. The study of the physical behaviour of substances when heated leads to the construction and use of thermometers and to the understanding of the value of materials for clothing. The chemical behaviour of substances on heating leads to the appreciation of certain stuffs as food, and to the proper understanding of the nature of combustion, with its enormous bearing on household economy. This is not the place to go into details, but the above will give an idea of what I mean. As the domestic arts are taught the cooking of many dishes, washing in all its details, even to the cleaning of coloured silks and Jaeger garments, and housewifery, including sick nursing, and the cost of a meal.

In order that this scheme may be successful, the same teacher should give instruction in the three subjects, and the teacher should be fundamentally a science teacher.

I must insist upon the fact, that unless these subjects have an educational value, they have no right to be taught in elementary schools. Utility *per se* is not a sufficient reason for

teaching a subject, but it is, I am afraid, often considered sufficient for the introduction of cookery into the curriculum of the elementary schools. I would humbly suggest that for mere utility, there would be a gain if the boys could learn cooking; they would then, as men, be able to obtain a good meal, the lack of which is believed to drive them so often to drink, and their unfortunate wives would not then be held responsible for their husband's shortcomings. It would appear that cooking, just for itself alone, would have more far-reaching effects and higher moral results if taught to boys as well as to girls. I am not sure that the necessity for domestic subjects is not rather overrated in the case of girls. It seems to be assumed that they must all live by practicing domestic arts, and hence these arts must be drilled into them at all costs. Many, however, earn their living by working at various trades, wherein their wage-earning power is in no wise increased by proficiency in the domestic arts; but they are all sacrificed to the domestic fetish. They are taught a little cooking and washing during time which should have been used in cultivating what I may call "gumption." They are therefore less valuable to their employer, and when the opportunity for cooking and washing arrives they will have forgotten the little they learnt at school. If the improvement of their homes is the sole object of teaching them housewifery, laundry work, and cookery, then the training is unscientific and educationally far less useful than it might be. There is a tendency now-a-days to consider that these things are scientific in their bearing and to miscall them "domestic science." They are not domestic science at all, they are domestic arts. I do not for one moment want to deny that all these subjects are useful—in fact every woman, and I might say every man also, would be the better for knowing something about them—but when we consider the terribly short time at the disposal of the children, it is not sufficient that they should be taught *good* things; it is of the utmost importance that they should be taught the *best* things. But—and this is the point I want to emphasize—although the arts themselves are not efficient educational factors, the science underlying these arts can be taught with immense value to a girl if it be taught by the right people. It can be taught in such a way that it benefits every girl alike, whether she works in a factory or toils in a home. It becomes, therefore, of urgent importance that the right teachers should be obtainable.

The teachers have usually followed a course of training calculated to make them practical house-keepers able to teach their own subject as a craft. But can the art of housekeeping be taught to children of 11, 12, or 13 years of age? It is only when the subject can be made a vehicle for training that its utility should be recognised, otherwise it becomes merely a tax on memory. The cooking for instance is a mass of recipes which possibly frequent practice may cause to be moderately remembered for the time but not understood, the laundry work more recipes with less exactness, and the housewifery a practical joke. It might be thought that this state of things would be improved if scientific explanations were introduced at various stages, but explanations to the children, although a little better than nothing, are far from being sufficient. An explanation of a fact, given by a teacher, by no means necessarily causes understanding on the part of the child. Learning the explanation is of no use unless the child sees the reason in her mind, and other methods are much better for obtaining that result. This is the main difference between scientific training and other training. Explanations of observed facts should come from the child, and not from a teacher, and the child should be led to devise ways and means of supplying satisfactory reasons for herself.

A further step is now being taken which, at first sight, seems very satisfactory, and is, indeed, a considerable advance, but the weak point of which I will endeavour to show. Into the various branches of the domestic economy course are being introduced experiments of a physical or chemical nature, which have a bearing upon, or relate to, the particular domestic problem under discussion. This is like building a house without foundations, but pouring in a little concrete here and there on the ground floor after the house is finished. It may strengthen the house, but it is obviously not the best way to do it. So these experiments are helpful in the understanding of the domestic problem, but they should come first, and the domestic incident be used as an example. These merely illustrative experiments lose all continuity. It must also be seen that the same experiments may be repeated in different branches of the subject, for overlapping, with its consequent waste of time, must certainly occur.

As an example, the laundry teacher would evaporate some water to shew the solids whose presence in solution made the water hard,

while the housewifery teacher would wish to do the same experiment when dealing with drinking water, or the cookery teacher when discussing boiling. The treatment of the science as the definite fundamental subject will obviate these difficulties and have results more far-reaching than the teaching of the mere crafts, results of infinite value to those who will pursue those crafts, and of equal value to those who will not.

I should here like to quote the statement of Dr. Kimmins, the science inspector of the Technical Education Board. He says in the Board's last report, referring to secondary schools:—

“In physics, previous to the introduction of physical laboratories, subjects were taken that could be dealt with in ordinary class-rooms, and the apparatus used for lecture illustrations was of the most meagre description. In inspecting schools in 1892 for the purpose of Llewellyn Smith's report, I was much impressed with the unsatisfactory nature of the teaching in this department. Young boys were introduced to difficult branches of the subject, and facts, the bearing of which was imperfectly understood, were committed to memory to meet the exigences of grant-earning examinations.

“The recent introduction of courses in experimental science, in which the work is almost entirely practical, and includes useful exercises in elementary mensuration, weighing, and elementary mechanics, has been attended with the best results. Boys take the best possible interest in this work, and when the exercises are arranged in a systematic manner it forms an invaluable introduction to other branches of physics. It will, moreover, prove of great service to boys who will enter workshops on leaving school.

“The more difficult branches of physics are now usually introduced at a later stage than formerly, and after a good preliminary training in weighings and measurements.

“In the teaching of chemistry, radical changes have also been introduced. Qualitative analysis, which has always been the bane of practical chemistry teaching, is now taking its proper position in the courses of instruction in this subject. In badly-equipped laboratories, where thirty or forty boys were taken by one master, it was the only kind of practical work possible. The necessary appliances consisted almost entirely of test-tubes and bottles of reagents, and, moreover, grants were awarded on the results of examinations in this subject. A scheme of work including the investigation of bodies, the preparation of gases, &c., and the general introduction of quantitative exercises, is only possible where the laboratory is well equipped, and, which is a matter of the greatest importance, where there is an adequate teaching staff, so that not more than twenty boys do practical work together under one master.

"In a few cases there is a tendency to cling to old methods of practical work, but the more rational kind of instruction is rapidly gaining ground, and the teaching in the lecture-room and laboratory is no longer divorced as in the days of qualitative analysis.

"The improvement with regard to science teaching in girls' schools is about as marked as that in boys' schools."

What Dr. Kimmins has said of the utility of such work to boys on entering workshops is equally applicable to girls on entering kitchens and laundries. Those of us who are doing our best to improve the science teaching in girls' schools owe a debt of gratitude to Dr. Kimmins for his sympathy and support.

Now, in secondary schools where girls remain until they are seventeen or more, it does not very much matter if they are taught cookery as an art or not. They have a good enough general education, and a sufficiently reasonable scientific education (which, as Dr. Kimmins points out, is gradually and surely improving) to enable them to grasp the nature of the problems and to attack them intelligently. But in the elementary schools the case is very different; the domestic science is to *train* them. Hence the teachers for this work should receive a different training from that received by those who work in higher spheres.

The polytechnic schools of domestic economy and cookery, provide a course of training for women, whom I may divide into three classes: 1, those who will use these subjects as a handicraft: 2, those who are to teach in similar institutions to women of the first class: 3, those who will teach in elementary schools. With regard to the first class it is interesting to learn from the report of the Technical Education Board that "there is a constant demand for the services of girls who wish to enter service" at the end of the course. The consideration of the second class comes more within the scope of Miss Pycroft's knowledge and work. I believe that there is no course specially adapted to the requirements of the third class in any polytechnic, and I should like to suggest a course. In the first place, the girls should have been at a good school until the age of about seventeen years, during which time they should have received an elementary education in science, a course such as that given in the syllabus of the Association of Head Masters or drawn up by Mr. Heller as "domestic science," or sketched by me in a paper

which I had the honour of reading before the British Association last year. It is to be expected that after this a girl will have learnt how to think; she will not necessarily have much scientific knowledge, but will have acquired a certain amount of scientific habit. Now let her go to a college or to a polytechnic where the teaching is of approximately university rank. Let her study physics and chemistry in a thorough fashion; she will repeat her former work in a better laboratory with more delicate apparatus, and thus she will see the weak points in rougher methods and understand the sources of error. But she must of course go much farther into the subjects themselves than she has hitherto done, and should if possible undertake some simple piece of research. Concurrently with her science course she would be studying the arts of cooking, washing, and house-keeping, with some physiology and hygiene. I want it to be understood that in her case it is not sufficient to just play politely with physics and chemistry, she must do real quantitative work, and not be content with pretty experiments. It may be considered by many that only those points should be studied which immediately bear upon the domestic arts. I will give an illustration to shew how advanced the necessary science must be. Every cookery teacher is required to know something of the nature of foods; water and salt may be easily grasped, but organic chemistry is required when we come to alcohol and vinegar, while the mysteries of proteids and sugar are yet unravelled. Now, I do not mean that the girl, whose career we are considering, should teach her later pupils the constitution of the sugars, but I maintain that her knowledge should be considerably in advance of what she has to teach, and that she should not resemble that teacher of first stage physiology who pioneered his class successfully through the skeleton by keeping himself one bone ahead of his followers. Having gone through this course, which I fancy should be one of three years—but I do not wish to dogmatise on that point—our student may, if necessary, learn the art of teaching, and can then commence work. This sort of teacher will do an infinite amount of good in the elementary schools. I am accepting the facts as they stand when I say that this teacher is to know her domestic arts well. Both the London School Board and the Joint Committee on Manual Training require these arts to be taught. What I want is, that they shall be taught as accessories to scientific training,

and not that a smattering of scientific knowledge shall be subservient to the arts. If the former course is followed, we shall gradually make all our poorer women more intelligent, and thus raise the intellectual standard of the race. If the latter course is to be adopted, we give them no chance of throwing intelligence into their work, but bind them down to rule of thumb for the whole of their unnatural lives. It may be asked, how are teachers, such as I have suggested, to be obtained? Since they will be working with elementary school children, I must assume that they are of the same class as other elementary teachers. Now, scientific teaching needs a higher intelligence than literary or arts work, so something might be done to encourage the more intelligent girls desirous of becoming elementary teachers to take up this work. At the present time the encouragement is on the other side; the teacher of the ordinary subjects obtains I believe, a higher salary, has more opportunities for promotion, and also has always the hope of obtaining a head mistressship. There is, I think, often a feeling that teaching these practical subjects is a little less dignified than instructing others in the mysteries of parsing and practice. But the social feeling of disqualification will at once disappear if the subject be studied and taught in the way I have suggested. Make a course of nearly University rank compulsory, and the social status of the teacher is settled. The money question is far more serious but could easily be arranged by the action of the London School Board or Joint Committee. When once that is done, good teachers will be forthcoming. I know I shall be accused of having suggested an impractically elaborate scheme, and am quite prepared to own that I have counselled a perfection to which I fear it will be long before we shall attain. We can, however, start upon the right path for our future teachers and give all the help in our power to our present ones.

Although I have sketched an ideal course to be followed by teachers for the elementary schools, yet I know that at present no systematic course for such has been devised. Consequently I do not wish to complain of those teachers who are already engaged in this work, but would rather extend my cordial sympathy to those who are endeavouring, amidst the difficulties of their work, to study its scientific aspects, and who are devoting some of their little leisure to the repairing of lost time.

## THE RELATION BETWEEN GENERAL AND TECHNICAL EDUCATION.

By MISS E. P. HUGHES.

Member of the Technical Committee of the Cambridge Town Council.

In considering such a difficult and complicated problem as "The Relation between General and Technical Education" it will probably save time to begin by defining the two kinds of education. I propose to use the term "technical education" in a different sense from that in which it is interpreted by the law of England, in connection with the Technical Instruction Act. As my audience is doubtless aware, technical education is a delightfully elastic term, which most obligingly includes almost every subject except Greek and Latin and the teaching of a definite trade, with the sole exception of the trade of home-making. Educationalists give to this term—technical education—a different meaning, and it is in the educationalists' sense that I propose to use it to-day. I will venture to define it as any special preparation in knowledge and skill which is required for any skilled work. This obviously excludes unskilled work, and for practical reasons I propose to exclude also from the present discussion the technical training required for the professions. Professional work assumes a basis of *liberal* education, and therefore preparation for that work can be isolated and treated separately. As a matter of convenience I propose, therefore, to limit my inquiry to technical education as a preparation for skilled work other than professional.

General education I take to mean the development of the whole individual as an individual, and not with reference to any special work which he may be going to make his life-work. I wish to emphasise strongly the essential difference between preparing a mason for his trade, and giving an all-round general education to a boy who may become a mason, or a carpenter, or a lawyer. The end in view in these two cases differs so fundamentally that I think it is fairly safe to assume that the methods appropriate in the two cases are also likely to differ greatly. The real importance of the relation between general and technical education can only be appreciated by those who see clearly the fundamental differences between these two kinds of education.

The importance of technical education should scarcely need emphasising at this stage of



civilisation, but there is one aspect of the question which is not often emphasised, which perhaps I may be pardoned for introducing, as it appeals especially to teachers connected with general education. After school days are over, one of the biggest factors in the education of an individual is the way in which he carries out his life-work. His happiness is largely affected by his attitude of mind towards the work by which he earns his livelihood, and to which he has every day to devote much time and thought and energy. If he is intelligently interested in it, if he knows its latest developments, and especially if he himself invents improvements, however small, his life-work must be a source of great pleasure to him, and also a source of considerable education, instead of tending to become more and more mechanical, and therefore tempting him to fly to excitement, very often unhealthy excitement, to counteract the monotony of his work. There is also scarcely any kind of work which would not be better done if the workman thoroughly enjoyed doing it, rather than did it only because spurred on by necessity. It is therefore of the greatest importance that technical education should be carried on satisfactorily, affecting as it does the intelligence and happiness of the workers as well the efficiency of the work.

In almost every institute for technical instruction which I have visited, the same complaint has been made: "We cannot do our work properly because our pupils are badly prepared when they come to us," which really means that these pupils have had an unsatisfactory general education. Technical education at present is undoubtedly hampered because the general education which precedes it is not carried on satisfactorily. Technical instructors grumble, and grumble considerably, at the teachers who give general education. My opinion is that a good general education ought to prove a satisfactory basis on which to build up a satisfactory technical education, and that the technical instructor has a right to expect certain powers, certain skill, and certain knowledge in boys and girls who come to him from a general school. We general educationists must consent to have our work tested in this way, and we must not be satisfied with our course unless we send to the technical instructors boys and girls possessed of certain knowledge and skill. But we maintain strongly that this test by the technical instructor is not a complete test of our work; and it is possible for us to satisfy it, and yet not be giving a satisfactory general education. No man is

only a skilled workman, and we have not only to prepare him for technical work, but also for his life in society, and as a member of a community. Again, he is an individual with the rights of an individual, and this life is not all. We have to arouse in him many and varied interests outside his life-work, his home, and even his nation. We must teach him to enjoy his leisure—that leisure which every man ought to have each day during his working years, and also that time of leisure which in the normal life ought to follow the years of hard work. We, in our general education scheme, have to lay the foundation for all these sides of life, and not only for the technical side. Still, the man of whom we are speaking is a skilled worker, and must earn his livelihood, and we acknowledge that his general education must include a foundation upon which to raise a satisfactory technical training, and I agree with the many who complain that we do not at present lay this foundation altogether satisfactorily.

Let us try and see what it is that the boy ought to know, and what he ought to be able to do before he passes to the technical instructor.

*First.* He ought to have been trained to observe carefully and accurately, to be capable of quantitative as well as qualitative observation, of intense and prolonged observation, and lastly, of that kind of observation which is required when experimenting is used.

*Secondly.* He ought to have been taught to make careful and effective records of observations. He should be able to draw and paint what he sees, and thus use "this shortest of all shorthands." He should be able to describe verbally, and to write clearly and vividly, an account of what he has seen.

*Thirdly.* The boy should have been taught to gain knowledge by reasoning, and he should have felt the delight of tracing cause and effect.

*Fourthly.* He should have been kept in a hungry state of mind. The natural inquisitiveness of the child, which is so often regarded as troublesome, which is so little encouraged in some of our schools and homes, which in itself is easily satisfied, may be developed into that intelligent and keen desire for knowledge which is characteristic of the well educated man and of the scholar. This inherent and childish inquisitiveness should, of course, be developed, and the boy should be taught to want to understand what he does not know, to be able to detect difficulties, and to be keen about solving problems. It has been truly said that some of the

teaching methods of to-day, tend to crush out, rather than to intensify this hungry state of mind.

*Fifthly.* If an intelligent intellectual hunger has been developed, it follows, as a matter of course, that this state of mind becomes a strong motive for intense and prolonged work. Also, in developing that intellectual hunger it follows, as a matter of course, that the boy should have been taught to work by himself, to think for himself, to know how to use books and teachers and lectures, and also to enjoy his work keenly. "Please don't help me, I can do it myself," I heard a little child plead with her teacher, the other day. The power of grappling with a difficulty by oneself is an immense help in all technical training.

*Sixthly.* No general education is complete unless the historical side is represented. We are placed in this world for a short space of time only, and we were never meant to live only in the present. Education enables us to stretch out our time-horizon into the past and into the future. One of the most important lessons which the historical aspect emphasises is the idea of progress and of evolution. It is of the greatest importance to teach a modern boy not to be satisfied with what exists at present, not to wish that things should remain as they are now, but to be on the look-out for improvements. Whatever work we may be employed in, it is of paramount importance in these days of rapid progress that the worker should realise the necessity of invention and improvement, and become more and more accustomed to the idea that these would naturally be discovered chiefly by those actually engaged in the work.

*Seventhly.* I think the technical instructor has a right to ask us to send to him pupils fully developed physically, not with bent backs, contracted chests, and short-sighted eyes, but strong and vigorous boys and girls, with well-developed and agile bodies. The extraordinary concentration of population into big towns, which has been so marked a feature of English life of to-day, makes it inevitable that a very large number of English children should spend their childhood in towns. It is impossible to make the conditions in towns as wholesome for children as in the country, but education can help to neutralise some of the drawbacks. For example, an excellent system of drill, encouragement of games, and developing an appreciation of beauty in art will do much to make up to the child for the loss of the health and beauty which is only to be obtained in the country.

*Eighthly.* The technical instructor has a right to demand a certain amount of general manual dexterity, not the special dexterity required by any special trade, but the general manual dexterity which is the basis of all skilled manual work. It has been urged that the man who cannot use his hands is not a completely educated man, and this is true I think.

*Ninthly.* In these days of increasing co-operation it is very important that our workmen should learn to work with other people, should know how to obey, to organise, and to command. Games and school societies give excellent opportunities for developing this power of co-operation.

It may be asked—Would you teach a boy science before he goes to the technical institute? My answer would be that if the boy can observe and record well and can reason, if he is skilled in manipulation, if he has learned to work by himself, and can work with others, the technical instructor could soon teach him all the scientific knowledge required to form the basis of his particular trade. Probably, however, the easiest and most desirable way of developing these powers would be to give him, by the best possible methods, among other things, some elementary knowledge of the two most fundamental sciences—physics and chemistry.

It may be asked, would you teach him modern languages? We all know how hampered English lads are at present because of their ignorance of foreign languages. My answer would be this: I should certainly make the general education of every boy include one foreign language, because it has been rightly said that no man knows any language until he knows two. If he has been taught one foreign language in the right way, that is to say, if his ear has been largely cultivated, if his power of speech has been developed, and if the grammar has been intelligently taught, he will gain easily such other foreign languages as may be required for his work.

I think that if a boy goes to the technical instructor possessed of the nine qualifications which I have suggested, the technical instructor would have no reason to grumble, and we should have done a part of our work in providing a satisfactory foundation for technical training. I would, however, rigorously exclude from our general schools all strictly technical subjects. The time and place of teaching them is elsewhere. If a good foundation is laid the technical instructor can teach his part more rapidly, and more intelligently, if it

follows a good general education, than if general education and technical instruction went on side by side, at the same time and in the same place. If they are separated we shall also be less inclined to sacrifice the one for the other, and more inclined to use in each case that kind of method which is most appropriate.

I turn for one moment to the general education of girls. At the present time in our elementary schools their general education usually includes two technical subjects, sewing and cooking, and in some cases laundry-work and hygiene. I would, without any compunction, exclude all technical work from our girls' schools. As this view is at present a great heresy I will attempt to give some reason for it. I consider that the most important trade in England, that in which we employ the largest number of people, which is the worst paid, and in which the work is at present the least well done, moreover perhaps the only trade which can never migrate from our shores—and therefore it is the more important that we should improve it—is the trade of *home-making*. How little does modern science really improve the home of the working man? How little are real business methods to be found in the management of middle-class homes, and what a waste of time and energy there is in the management of a very large number of the homes of this country. The home-maker is only too often a half-educated woman, who has never made it her business to learn her business, and who usually knows nothing of the scientific basis of her work. To a large majority of girls home-making will be the most serious work of their lives, and to all a certain knowledge of house-management is of considerable value. I should suggest, therefore, that after a girl leaves school, she should, as a matter of course, take six months in a technical institute (in evening classes if otherwise impossible) and study the following subjects connected with the management of a home:—

1. Sewing, not the ridiculously fine needle-work which I sometimes see in some schools, so detrimental to the eyes and back and lungs, and so useless for practical purposes, but the kind of sewing that a girl of that particular class would need, and for economical reasons I should include a little knowledge of millinery.

2. Cooking.

3. Nursing.

4. The principles of the management of a healthy home.

5. The general principles of the training of young children.

If a woman marries, and this will obviously be the case with all except a small minority, or if, as daughter or sister, it falls to her to manage a home, it is clear that she should undergo a longer and more detailed course. If she receives some information about the reforms in home-making, which are being discussed to-day (and many reforms are necessary!), if she is told something of the customs and habits of other countries and other times, we should not find so much of that foolish conservatism, which assumes that because a thing was done in a certain way in the past, it follows essentially that it shall continue to be done in the same way. In this day of constant change and progress, and of great development in applied science, it is of the greatest importance that our home-makers should be on the alert to develop and improve.

I therefore suggest not less but more technical training for women, but would urge that it should *follow* their general education, and be at a different time and place. It is obvious that a cooking class in an elementary school must interfere with the regular work of the school, and that sewing takes up a vast amount of time, time which is wanted at that stage for other things. It is sometimes urged that unless a child begins to sew early it will never sew well. The fact that men are (alas!) our best dressmakers, and that most of them begin their apprenticeship beyond the elementary school age, proves I think that this is not a fact. The educational value of sewing is, I believe, very small, for one knows that girls who have spent many hours in sewing, are remarkably clumsy in a laboratory. The manual dexterity acquired in sewing would naturally be small, because the movements required are so few, and there are so few tools used. The accuracy of cooking is also not sufficient to make it of any great educational value.

While I would thus give our girls a short course on home-making, say six months, I would venture to suggest that the boys should not be forgotten. When they have left school, they might be taught a small amount of carpentry, and the simple mending which is required in all homes. This would prove very useful, and a boy who was going to the Colonies could take a longer and more complete course. Some training in first aid in cases of accident would also be of considerable use to boys.

We have heard frequently lately that Germans are absorbing a good deal of our trade because of our lack of technical instruction in England. I once asked an intelligent German who had

been giving me some startling facts about certain parts of British trade which had got into German hands, how it was that after all British trade was still fairly large, and how it was that we had held our own so well in the past? His answer was that we had succeeded in the past largely by a combination of luck and British pluck, and that this was not a sufficient basis for permanent success. I hope in the future we may possess also highly trained technical skill and knowledge, as well as British pluck and enterprise, and I have no fear then but that the British citizen will hold his own and do excellently in the skilled work of the world.

Let me once more return to the chief points of my paper.

*First.* No technical instruction can be satisfactory unless it is based on a good general education.

*Secondly.* While the technical instructor has a right to expect a certain knowledge and power and skill in his pupils, this end alone is not sufficient for general education, which must do more than lay the basis of technical instruction.

*Thirdly.* It is of great practical importance that we separate the time and place of general education and technical instruction.

*Fourthly.* The nine qualifications for technical instruction which I suggested, supply, I think, the reasonable demands which technical instructors may make of those who control general education.

*Fifthly.* The trade of home-making, because of its great importance, deserves special training and special help. It is not for the sake of the woman that keeps the home, but for the sake of all those who use it, that I would plead that a considerable amount of money should be devoted to teaching English girls how to manage a home economically and at the smallest cost of time and effort. This will never be done until it is realised that to manage a home really well requires considerable intelligence, much knowledge, and considerable skill. It is in fact highly skilled work, and can only be done by a highly skilled workman.

Let me conclude by urging that it is much to be regretted that the term "technical" is used in more than one sense. The most desirable meaning appears to be that which is accepted in this paper.

Mr. J. H. REYNOLDS said he thought Miss Hughes was entirely right in insisting as strongly as possible upon the absolute necessity of restricting our ele-

mentary and secondary schools to general education. Only in that way was it possible to prepare pupils properly for the technical schools of this country. In other countries the educational system was based upon the idea of compulsory and general education dealing only with those subjects which would train the faculties of the pupils, and fit them for their future life, as men or women—based upon the idea that the instruction given them shall be continued long enough to make it a permanent possession, and thus enable them to take advantage of the technical and special education which was afterwards given in the schools arranged for the purpose. They were urged yesterday to observe the necessity of sending our children well prepared into these special technical schools, and he thought they ought to bear in mind that the British representatives at Congresses such as that must look very seriously to the fact that our position as successful competitors for the world's trade and commerce was at stake. If that were so, then the nations with whom we were in most serious competition were the nations we ought to study, and when we did study those nations—whether German or Swiss—we found that their success was due not to the introduction into the general schools of a variety of subjects of a special character, but to the establishment by them of a sound system of general education, continued compulsorily until the pupils reached 14 years of age. If parents insisted that their children were to be wage-earners in the household, and at the same time that they should be taught these so-called practical things as aids to a living, they were asking for two absolutely incompatible things, and were undermining the future of the boys and girls of this country by turning them out of the schools imperfectly trained and educated.

Dr. GLADSTONE, F.R.S., wished to say a few words about a subject which had been before his mind a great deal—and the success of the London School Board, in introducing this kind of education, gave warrant for the hopeful prospects we now had, Practical education was being introduced in all directions, and he especially wished to confirm what had been said about the importance of domestic science, which appeared for the first time in the Government Code. It appeared in the Code of the day schools, and in a much more practical and complete manner in the Code for the evening continuation schools. At present, of course, it was optional, but if the popular appreciation of it increased, they would find, he hoped, that it would soon become a necessary part of education.

Mr. R. E. PANNETT (North Riding Technical Instruction Committee) said if Miss Hughes spoke of her opinions as heresies, he certainly was on the side of orthodoxy. If they were to take out of the elementary schools the subjects to which Miss Hughes objected they would be running the danger

of making the education in primary schools too bookish, and he believed the object they all—Miss Hughes included—had in view would be better accomplished by including practical matters in the education rather than by eliminating them altogether. That view had impressed them very much in North Yorkshire, and a deputation from the three Ridings waited upon Mr. Acland, who, in a very important deliverance, which was not reported, said the Education Department would be prepared to give opportunities for practical teaching—for example, in cottage gardening in rural elementary schools. He believed that if that plan were followed, so far from the time thus used being detrimental to the acquisition of proper knowledge, it would make the scholars more interested in everything about them, and conduce to their being better prepared to benefit by technical education when the time came for them to receive it.

Mrs. PILLOW was very sorry to find herself in opposition to such an eminent authority as Miss Hughes, but she could not agree with her in saying that technical subjects should be taken entirely out of the elementary schools. What could be done with girls of 13 or 14 years of age who had never been taught the use of a needle, or how to cut out a garment? It would be a bad thing for our elementary school children if they received no technical education until they left the elementary schools. On the contrary, she thought they should include as much domestic science as possible in the curriculum. She had been lately brought into contact with many of the high schools of the country, and she had been disappointed by the answers and attitude of some of the head-mistresses, who seemed to be insulted at the suggestion that their girls should receive education in domestic subjects. It seemed a pity, for if head-mistresses looked at things from that point of view it could only be expected that girls would look at domestic science in the same light, and it would be very difficult to combat the prejudice that the study of domestic economy was undignified. She did not want them merely to be taught in a *dilettante* way, but certainly they should be taught to appreciate such education at its real and proper importance, and to understand that ignorance of the "why and wherefore" of the problems of home life was really undignified. The principles of domestic economy should be incorporated as part of the general education of the girls, and, where possible, actual practical instruction should be given.

Miss HUGHES, in reply, said she did not want to turn out practical work from the schools, but rather to develop manual dexterity in the schools giving a general education. She thought it was the increasing opinion of experts that sewing and cooking were, educationally, of very little value. There was something to be said for sewing and cooking, but from the practical side, and not from the educational one. It was sometimes said that if they could not

be taught when the pupils were young, they could never be taught at all. That was ridiculous, because the best dressmakers in the world, she was ashamed to say, were men, who, she was sure, did not commence before 14 years of age. She thought the amount of time wasted in elementary schools upon sewing was disgraceful. She was sure that if they developed the child's mental dexterity in other and more educational ways, during school life, it would be able much better afterwards to take the training, which every woman ought to possess, in cooking, sewing, &c. Many of our English homes were at present badly managed by half educated women who had never learned their business. She believed the time was coming when no young woman would undertake to manage her own home, or anybody else's, until she had received a thorough training in such management, but that, she maintained, should come after school life, when it could be given much better and much more shortly—and she believed she would even live to see it.

The CHAIRMAN said the meeting had come to a close with a very interesting and characteristic speech by Miss Hughes, full of most refreshing heresies, which would set them all thinking upon matters about which perhaps there was too little thought. He could only express his regret that there had not been time for a more thorough discussion of the excellent papers before them. Happily, the papers would be printed and circulated, and they would then receive careful perusal. He was sure they would all heartily thank the ladies who had favoured them with their papers that morning.

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FRIDAY, JUNE 18, 1897.

SECTION B.

The Right Hon. Sir JOHN GORST, M.P., in the chair.

TECHNICAL EDUCATION IN INDIA :  
ITS CONDITIONS AND PROSPECTS.

PART I.—THE GENERAL CONDITIONS.

By J. A. BAINES, C.S.I.

In approaching the subject of this paper much ground has to be traversed which will probably be new and strange to those who are familiar enough with the conditions of technical education in modern Europe or America, where their evolution has been rapid, and is brought home to us by personal observation or by the circumstances of our everyday life. But, as regards India, we are brought face to face with a state of society so different in many important directions from that with which we are here familiar, that at the risk of inflicting a platitude

on his audience, he must ask them to bear in mind that technical, like general education, in order to fulfil its object to the utmost must be the outgrowth of the community which it is to benefit, and if imported in the first instance from abroad, unless it be adapted to the soil and not impatient of the modifications imposed by local conditions, it must remain an exotic, watered and tended under abnormal circumstances, under alien auspices and influence, the withdrawal of which would deprive it of its sole chance of existence.

In regard to the organisation and development of not only technical education, but of its general social structure, the greater part of India is now very much in the stage in which Europe seems to have been towards the end of the middle ages. But the history of the latter brings us no lessons as to the probable course of events in the former, since we are dealing not only with an Oriental civilisation, but with one which, itself of a peculiarly stable character, has been suddenly brought into more or less close contact with the influences of the most energetic and progressive of modern types, and is not, therefore working out its destiny in its natural way, but on lines which it is assimilating from foreign suggestion. Nor, again, is India in a position to take advantage of more than a fraction of the example set before it by Western Europe. To begin with physical characteristics, the resources of India consist almost entirely of cattle and agricultural produce. Coal and iron, the chief essentials of modern industry, are found, it is true, but not to such an extent or of such a quality as to suffice for the support of wide-spread factorial enterprise. The tropical climate, again, is adverse to the concentration of large masses of artisans engaged with steam-power, and we must also allot due consideration to the fact that the same cause renders subsistence obtainable on comparatively easy terms, so that the attainment of a higher standard of living is by no means so powerful an incentive to enterprise and hard work as it is amongst the more hardy strugglers of the regions less favoured by nature. Other reasons, which will be touched upon later, combine to make the population of India essentially agricultural and rural in its proclivities, and to check that tendency towards congregation in towns and cities which is so marked a feature in the civilisation of the West.

The weakness of this tendency in India can be appreciated from the fact that scarcely 5 per

cent. of the population is found in aggregates of 20,000 and over, and that these aggregates lie at an average distance of 90 miles from each other. The bulk of the people live in villages, having a mean population of no more than 360 each. The constitution of these units, or what is known as the village system, which prevails more or less uniformly over nearly the whole of the country, is not only one of the most interesting studies which Indian sociology presents, but is of the utmost relevance to the subject in hand, serving as it does to denote, in a general way, the limits of the field open to the development of technical education. To put it as briefly as possible, the village is a certain definite area of land in the occupation of a cultivating community, the members of which, for safety and convenience, collocate their dwellings within it, instead of living each family on its farm. The nucleus of each village is the group of agriculturists, whether connected by tribe, blood, or merely by descent from the original settlers, amongst whom the lands are divided. These constitute the *raison d'être* of the community, and the rest are there to minister to their requirements. The aim of each village is to be self-contained and independent of all outside its boundaries. In the present day, owing to the development of the means of communication, and the efficient protection afforded by the British Government, this feeling of exclusiveness has been necessarily much weakened, but the framework of the original conception remains. All the simple needs of a cultivating community under tropical conditions are provided for by the inclusion of certain recognised artisans, each with his definite position in the village hierarchy. The potter, carpenter, blacksmith, weaver, silversmith, as well as the personal services of the barber, find each their place, which the incumbent cannot advance; nor will the community allow him to suffer by the encroachment of others. The important points in connection with the present subject are, first, that these artisans and others are remunerated, as a rule, by either grants of a portion of the village land, which they are at liberty to till for themselves or lease to others of the community, or by a fixed proportion of the annual crops; and, secondly, that wherever, as a modern innovation, a service has to be paid in cash, the price is fixed not by competition, as no outsider is allowed to intervene, but by village custom. On the other hand, the artisan is essentially the property of the village, and, as a rule, does

not seek to extend his *clientèle* beyond its limits. In old days this restriction was, in fact, a necessity imposed by the condition of the country. Even if the means of communication allowed of extensive commerce, the traveller possessed of valuable property was pretty sure to be made to stand and deliver, if not by footpads, by the roving bands of the State forces, who picked up a precarious living out of reach of the more disciplined *régime* of the chief town of their employer. The traders on a larger scale, passing from town to town, had not only to pay for the shelter of every village in which they passed the night, but were mulcted at every town and frontier in the shape of undefined octroi and transit dues, and had to arrange, moreover, for a fresh escort when passing through each petty state or chieftainship. In village life, then, there was little or no trade, properly so called, and therefore no production beyond the amount required by the village itself. It is not to be wondered at that the distribution of occupations was largely limited to the few industries comprised in the village system, and even at the present day nearly 80 per cent. of the population are found under those heads.

We have now to take into consideration certain features in the social system intimately connected with our subject. That occupations of the class just mentioned should descend in the same families from father to son is not peculiar to the village system in India, but, in that country, we have the additional fact of prohibition under religious sanction of any departure from the traditional occupation. The strength of the entire religious system of the Brahmanic hierarchy lies not in doctrine or dogma, but in caste, the rule of life in which absolute heredity is the predominant feature. Each individual inherits at birth the position of his father, and however he may improve his material position, it is impossible for him to vary, for better or worse, his social rank. It is within his own caste that he must marry and seek his social success. No one outside it may enter his house, sit down to meals with him, or receive his daughter in marriage. Similar restrictions apply to his occupation, though old tradition has sanctioned, in some cases, the choice of one among several of certain professions, and the carpenter's son may become a blacksmith, or even a mason, in the south of India. On the other hand, subdivisions are constantly arising within the caste itself, and a few families who have prospered

and waxed proud often combine to intermarry only amongst themselves, and thus establish a superiority over their poorer brethren. A greater latitude in choice of occupation is in the present day allowed to the classes at the extremes of society than to the middle, and the Brahmins and writing castes undertake duties, within very definite limits, which were formerly unknown or prohibited to them. Similarly, and what is perhaps more pertinent to the subject, the labourers belonging to the menial or depressed castes, whose touch is polluting to the rest, have been the most ready to abandon the work of scavengers and field hands, which was formerly their only resource, for the more organised and lucrative employment in the comparatively few factories which have arisen within the last generation or two. There are well known instances, too, as in the cotton mills of Western India, and some of the jute mills in Bengal, where the middle classes of cultivators have discovered that they can engage, for part of the year at least, in factory work involving no violation of their scruples regarding ceremonial purity, in the way of being called on to handle forbidden material or to work shoulder to shoulder with those whom they regard as outcasts in their native village. Such cases, however, are at present exceptional, and the tendency to abandon the paternal calling is hardly apparent among the great agricultural communities, and still less among the wide-spread classes of village artisans.

From the above outline of the more prominent features of the life of the masses some notion can be formed of the length of time required before any system of education organised on the principles which commend themselves to modern Europe can take root firmly and congenially in the popular mind. The isolating tendencies of the village community, the subordination of individual life to that of the family, and of individual enterprise to the iron rule of caste tradition, the discouragement of co-operation in the more elaborate industrial processes, and of competition in the supply of the simple necessities of the existing standard of living, the cramping effect of heredity and custom revered to excess upon modification of that standard, and the glamour of religious sanction thrown over the most ordinary actions and events of everyday life, all these constitute social and economic drawbacks which can be easily appreciated. But it is scarcely necessary for one addressing an audience of experts such as we have before us to say, that there is another

and a more favourable side to the shield, and that the very obstacles which have been mentioned have in them the germs of a development which, under judicious treatment, may reasonably be hoped to give adequate results in the required direction. The domestic industries which occupy the attention of the great bulk of the artisan population foster the system of apprenticeship to a degree which in the West is now but a faint tradition. The children are trained from their earliest years with the utmost care in the occupation to which, under caste rule, they are bound for life. Even the toys and pastimes of the younger members of the community are moulded upon the caste tradition. The budding cultivator ploughs the sand before his doorstep, and plots it out in miniature seed beds, or causes it to bloom with marigolds and other flowers picked from the paternal backyard. If, by a fortunate chance, a gutter or streamlet be at hand, it is conducted on to the estate in tiny irrigation channels engineered in imitation of those in use in the village lands, instead of being frittered away in the manufacture of mud pies. The infant carpenter handles the adze with care and skill in the manufacture of ploughs, sheds or bedsteads for his playmates, making over the chips to the scions of the blacksmith's house or the silversmith, for a small furnace, at which the potter, if admitted to the company, dries his pots and pans, to be set out before a rude copy of the village godling. Under this system of family training, form, pattern and process are maintained unchanged from generation to generation, and the skill necessary to keep up to the hereditary standard is never allowed to deteriorate. In certain art industries, indeed, the caste feeling is carried still further, and trade secrets are kept inviolate for centuries. For example, the enamel of Pratápgarh is a monopoly of this sort, so is a special form of silk embroidery in Surat, whilst the Kashmiri weaver, when labouring *in partibus*, retires to a solitary well to mix the dyes which have made his work celebrated throughout the two hemispheres, and records the patterns he has inherited in the minutest detail, but couched in a trade diction unintelligible to all outside the fraternity. Then, again, in addition to the inherited taste and aptitude thus developed and the almost instinctive accuracy and delicacy of touch acquired, the caste-system seems to implant a habit of concentrating the attention on the work in hand and an untiring patience, which must turn out extremely useful when

imported into work upon modern lines by the individual; but they are qualities, it is to be feared, which will hardly withstand the corroding influence of factorial co-operation, where the conscience is not stimulated in the case of the majority of workers by the satisfaction of contemplating their work in the fulness of its completed effect. It may be a whimsical suggestion, perhaps, but one not altogether devoid of probability, judging from what has happened already in somewhat similar circumstances, that in course of time the artisans engaged in the various sub-divisions of manufacturing processes may form themselves into separate castes, according to the grade of the work on which they are respectively specialised, and the blacksmith by caste who is engaged on boiler-fitting, will decline to intermarry with the family of his caste fellow who makes rivets, and the latter, in turn, look down upon the man who has stuck to the anvil or bellows. We have already the silk weaver who refuses communion with the weaver of cotton, and the weaver in colours who similarly rejects the social approaches of his kinsman who works in plain white, the gardener who grows fruit who places himself above him who devotes himself to humble vegetables, and the carpenter who will neither intermarry nor sit at meat with the craftsman who repairs municipal rubbish carts, the reasons in the last case being sufficiently obvious to those who appreciate the Hindu sentiments with regard to external pollution. This fissiparous tendency is worth a passing comment, because it shows how the modern conditions of industry, instead of weakening the religion which regulates the social life of India, in reality, owing to the marvellous adaptability of that religion, is inclined to confirm it, whatever the extent to which, new avocations may spring up or the traditional occupations become modified by new circumstances. It is thus a characteristic telling in favour of the extension of the technical education, the taste for which it is to the advantage of the masses to develop.

It is here necessary to revert for a moment to a point to which reference has already been made in passing, namely, the comparatively weak influence of the town element in the population of India. That influence, indeed, is gradually spreading, and it is through it alone that technical education on modern lines can be transfused throughout the rural masses. But the growth of the town is of comparatively recent date. In old days, the only large cities were those in which a local ruler held his



Court, and here alone could commerce and industry be sure of protection and patronage. As was observed 70 years ago, by that shrewd traveller, Victor Jacquemont, the French naturalist, the power of an Asiatic sovereign decreases with the cube of the distance from his capital; all wealth and enterprise, accordingly, was attracted under his wing. But Oriental sovereignty was proverbially evanescent. With the exception of the Rajputs of Central and Western India, not a single chief of importance is of the race of the bulk of his subjects, and, until the establishment of a strong paramount power, able to keep the peace, change of dynasty at frequent intervals was the rule rather than the exception. Along with the chief went the prosperity of his capital, and the new broom as often as not made a clean sweep of the memory of his predecessor by removing his head-quarters to a distance from the centre of the late local interests. It was but natural again that the industries which were chiefly promoted by the vicinity and patronage of a Court should be those connected with luxury and art rather than those fostered by the requirements of the masses. Hence the repute of the fine muslins, the "woven air" of Dacca, the jade and inlaid metal-work of Upper India, the gold-cloth of Ahmedabad, the shawls of Kashmir, and many other products destined exclusively for the gratification of taste and luxury, but unknown to the population at large. The demand for such industrial enterprise vanished, of course, with the Court on which it depended for its support, and the capitals of bygone dynasties have sunk into the position of the superannuated Belle, to whom the gifts of Ninon have been denied. In their place have arisen the seaport creations of British rule and the inland *ganglia* of the railway systems. It is to these only that the rustic seems to be attracted, more especially, as has been already indicated, those at the two extremes of society, the professional and the field labourer. It is here that, in obedience to modern tendencies, industry has been localised. Bombay, Ahmedabad, and Cawnpore utilise the cotton of the tracts of which they are the centres. Calcutta monopolises the manufacture of jute and lac, other towns are flourishing mainly on the preparation of raw material for export. The railways themselves, by which the transformation has been effected, give employment in their workshops to thousands of artisans under European training and supervision. From centres such as these the workers

return to their villages with new processes, possibly new ideas, and, at all events, with a bundle of new tools, the advantages of which they are proud to expound to their stay-at-home elders. Indirectly, therefore, and very slowly, no doubt, but surely, the improvement of existing methods, the use of better material, and the demand for better results, are all permeating the village population, which furnishes recruits to the small army of industry which finds employment in the factories of the great centres.

This, however, is little more than the first step on the road. The men thus influenced have learnt mechanically, and do not, of course, save in an altogether exceptional case, attempt to go beyond what they have been actually taught. The ground has not been prepared for further and spontaneous advance. By technical education something more is implied than the primary process of manual training, but the instillation of even rudimentary scientific principles requires the previous assimilation of what we may call the irreducible minimum of elementary education before the pupil is capable of appreciating, still more of applying, those principles. Here, then, we must take into consideration the almost universal intellectual torpor which broods like a dark cloud over all but the comparatively small professional section of the Indian population. People who are unacquainted with the social distinctions prevailing in that country and the nature of the barrier between them, and who estimate the condition of general education there by the calibre of the young men who pursue their studies at the Universities, or who complete their education in Europe, are bound to misjudge the situation, and to spread over the whole population the credit due to a very small class. Again, those who have before them the returns of the Indian Educational Departments are naturally struck with the large numbers therein displayed, as well as with the great increase in those numbers within the last quarter of a century or so, but do not take into consideration either the vast population from which they are collected, or the quality of the instruction, so far as it appears in the tables. These three points, however, are all important to the subject with which we are concerned, and it is no disparagement to the progress already made, or to the strenuous efforts to continue it on the part of those engaged in this great work, to look the facts in the face. Nor can it fairly be called the tone of a cynic or

pessimist if on analysis the results are not praised without reference to the task still untouched. The first point to notice is that at the last Census no less than 94 per cent. of the population, including that of Burma, where education is more diffused than in the rest of the country, were returned as unable to read and write. Amongst the males, the proportion sinks to 89 per cent., but the fair sex show no less than 99½ per cent. Even more significant than these figures is the distribution, by race or caste, of those not illiterate, showing that out of 60 main groups into which the population, including Burmese and foreigners, are divided, only 11, amongst which are the Burmese and foreigners, show as much as 10 per cent. of their members able to read and write. The concentration of literacy is also to be inferred from the fact that the above-mentioned 11 groups comprise more than half the literates, but only 14 per cent. of the total population. Leaving out of consideration the women, the result is to bring in 20 groups instead of 11, comprising 18½ per cent. of the male population and 58½ of the literates of that sex. Of the agricultural group, 5, and of the artisans 4 per cent. of the males, are returned as not illiterate, and the only proportions which may be considered comparatively high are those of the Brahmans and writers, where they reach 30 and 43 respectively. These last, however, number little more than 4 per cent. of the population, so that, speaking of the population as a whole, it is not overstating the case to say that none but a few of the innumerable castes of the country have as yet shown any inclination to overcome their repugnance to book-learning. Here, again, it is the immoveable barrier of caste which has to be turned before substantial progress can be expected. In the eyes of the masses the three R's are no more than the tools by which the professional and trading castes get their living, instead of handling the plough, saw, or shuttle. Nor is there anything in the relative positions of the two sections which would induce the Brahman or writer to put the matter in any other light. It has been, indeed, the invariable policy of the Brahman when in power to withhold instruction, as far as possible, from the rest of the community, even from the castes of writers, who, however, being in many cases akin organically to the military class, managed to ensure their position at Court. The fear, openly expressed in Brahmanic writings of the middle and later ages of the pre-Musalman period, was that with the

increase of knowledge there might supervene diminished respect for the sacerdotal predominance. It is only since the firm establishment of British authority that systematic efforts have been made to diffuse the rudiments of learning among the masses, in the face of the apathy of the upper classes, and the unwillingness to break with tradition on the part of those for whose benefit the efforts are being made. Even now, in spite of the success which has attended the forty years' struggle, what has been said above shows clearly that it is the upper classes who have taken most advantage of the facilities afforded to all alike. The result has been the overstocking of the market in the direction of clerical work and the liberal professions, especially law, a result which is also responsible for much of the unsatisfactory condition of modern Greece, and which is showing a tendency, it is said, to become prominent in our neighbour across the Channel. In addition to this tendency to exalt a class to a position more and more removed from that of the masses, and a class, moreover, which has aims and sympathies by no means in harmony with those of the majority of their fellow-countrymen, there is one other point in connection with the statistics of education which needs a word or two of comment as bearing upon our subject. It is the astonishingly small proportion of the three millions or so of pupils on the rolls which has advanced beyond the elementary stage of instruction. No less than 93 per cent. are found under primary instruction, 6 per cent. under secondary, leaving only one per cent. in technical, training, and university institutions. When we consider the reluctance of the professional classes to engage in mechanical pursuits, and the insignificant numbers of other classes who have attained even the first stages of instruction, it is easy to see that much has yet to be done before a secure intellectual basis can be said to have been obtained for a general system of technical education.

It remains to summarise the conditions described above in order that it may be seen what advantages they present which may be utilised, and what are difficulties to be overcome in diffusing such a system, and what form that system should take. Allowing that the movement in its favour must take its rise in the town, it must be remembered that it is in the country that its support must be sought, and from the village that it must derive its recruits, if it is to take root amongst the masses. The great majority of the population live, directly

or indirectly, by cultivation, under conditions that make their needs few and simple. Their life is spent chiefly out of doors. The house is used for cooking, for a stable, but only in the winter and rainy season for shelter. Rent for it is unknown, but so are drainage and the importunate offices of the plumber. Tropical diet is not costly, and is mostly grown in the village itself, superfluity of clothes would be inconvenient, and variety, except in the luxury of female ornaments, is reprobated, fashion being dictated by caste tradition. Social ambition, again, must be limited according to caste injunction, and there is no outlet but in unproductive expenditure in caste feasts and pilgrimages. The poorest member of the caste consorts with the richest on terms of social equality, whilst the richest is not admitted within the door of the poorest of superior caste. The comparatively few requirements in the way of industrial products are met by handicraftsmen, who stand and fall with their patrons, are attached to each village in an assured position, and seek no custom beyond. Fixed to their craft by caste and a sort of guild fraternity, they learn their work early, devote themselves to it through life, and thereby acquire great skill, but little adaptability, except within narrow limits. Their work is done by rule of thumb handed down by their ancestors, and scrupulously maintained by them for the benefit of their posterity. They have, accordingly, no special reason for acquiring book learning, and are, like the peasantry, almost universally illiterate. General education has at present touched few classes of the community outside those with whom it is the traditional stock-in-trade, and who have for generations held it as their monopoly. Unfortunately, their inclination towards clerical work and one or two of the liberal professions has stood in the way of enlisting their intelligence, patience, and other good qualities in the service of industrial processes, where no doubt those traits would meet with appreciation and recompense.

It is obvious that, in these circumstances, the initial impetus to technical education in India must be given from the outside, and, in order that it may not remain, according to the metaphor used in the opening of this paper, an exotic, dependent entirely upon foreign support and care for its frail existence, it is necessary to discover the line of least resistance along which the State efforts in the required direction may be met halfway by the spontaneous inclinations of the masses. There

appear to be two general tendencies, to which we may look for success in this respect. First, we have the appreciation of a higher standard of living, due to the great increase in the resources of the people for domestic expenditure which is a noteworthy feature of the last half century. It is, perhaps, inopportune to speak of this at a time when a great part of the country is in the throes of famine, but there is every reason to believe, judging by experience, that the check is but temporary, and that the progressive upward movement will resume its course when the scarcity is over. The steady increase of population, the improvement, apparent to the most casual observer who has lived sometime in India, in the dress, ornaments, household utensils, diet, and other personal attributes of the peasantry, together with the fact that the proportionate increase in the imports of merchandise during the reign of Her Majesty is far higher than that of the exports of produce and other goods,\* all combine to indicate a demand which would undoubtedly be stimulated by an increased supply of equal quality from the hands of their own countrymen on local terms. On this point much will be said by Mr. Bhownaggee, in the paper which follows this, as his opportunities for observation have been recent and extensive.

We may look, in the next place, to an influence which will come into play at a later period, and in an opposite direction to that of increased means. In the course of time there must inevitably be forced upon the people the recognition of a fact which is even now apparent in one or two tracts in India, namely, that the pressure of an increasing population has been hitherto thrown entirely on the soil; that in most parts of the country the most fertile land has been brought under the plough, and that the limits of remunerative cultivation under the existing conditions, has been nearly reached. Further extension becoming impossible, recourse must obviously be had to one of two alternatives. Either an outlet for the surplus population must be found in some industries other than agriculture, or, by what is known as intensifying the cultivation by the application of the teachings of science, two blades of corn must be made to grow where only one grew before. Whichever course be adopted, the key of its success is to be found in the steady diffusion of a well-devised and well-organised system of technical edu-

\* Taking the imports of goods in 1837 as 100, those of 1896 will be 1,468. The corresponding figure for the goods exported is 1,032 only.

cation, adapted on the one hand to the literate, who can teach but not practice, and on the other, to the intelligent, but hitherto unlettered, mainstays of the village industries. The stalwart conservatism of the peasantry gives way in India, as elsewhere, before considerations of immediate advantage, provided that the benefit to be derived from the innovation be demonstrated beyond a doubt, for the ryot is both shrewd and cautious. Most of the agricultural improvements which have been suggested were rejected with some contumely, until a close investigation of the circumstances on which the ryot formed his view and practice succeeded the assumption, previously adopted wholesale, that what was found an improvement in England must be equally advantageous in the tropics. That day is almost, if not quite, passed, and scientific observers have come to the conclusion that it is the system, not the detail, which requires modification. So with handicrafts, where the better results from the use of different tools or methods are duly appreciated in metal work and carpentry. The thin edge of many little wedges has been inserted between the past of custom and tradition and the present of individual judgment and trade advantage, but it is the combination of foreign impulse and native demand which alone can ultimately drive them home.

## TECHNICAL EDUCATION IN INDIA.

### PART II.—PRESENT CONDITION AND PROSPECTS.

BY SIR M. M. BHOWNAGGREE, K.C.I.E., M.P.

Of all the numerous subjects which a well-wisher of India is called upon to take into his serious consideration, there is none of such surpassing interest and importance as that of her industrial development, and as it is now a universally accepted principle that the growth of industries among a people is in proportion to their instruction in the sciences and arts applicable to their practical pursuit, the theme of technical education in India is one which, from reasons which will appear later on, I approach with much deliberation and with a certain feeling of anxiety. I must at once premise that the reflections which the subject presents in its economic, political, and educational aspects are so varied and vast that I could not pretend to deal with them here exhaustively. The multiform diversity of the ethical, physical, religious and social condi-

tions of the country and of the races inhabiting it, require the elucidation of propositions and exceptions with peculiar reference to the different provinces and castes, which the limits of this paper will not permit of my attempting in detail. In the absence of such special treatment of the subject, the information I convey and the conclusions I draw in the course of this paper might seem here and there open to doubt and objection, but when it is remembered that I am speaking, in one breath as it were, of a country not far short of two million square miles in extent, inhabited by a congeries of nearly three hundred millions of vastly diversified races of people, I cannot well be expected to treat the subject in any more definite and specialised, or rather less general method than that which I have chosen to employ. It is the only method possible in dealing with so vast an amount of matter in so short a space of time as is placed at our disposal.

The preliminary observations, before arriving at the point from which one can fairly consider whether the present means of technical education in India are adequate or otherwise, which I should have had to make, are happily embraced in the paper which has preceded mine, and of which I must ask you to consider this a continuation, although of a very inferior quality. You have had from a facile writer of considerable Indian experience, who has been for years a keen observer and judge of the varied conditions of her different provinces and peoples, some very sound views as to the circumstances which would demark a system of technical education in India from that adopted in Europe. Mr. Baines has told you of the want of coal and iron, of the simple needs of the people, of their indisposition to migrate to industrial centres from their agricultural village homes, of the limits which religion and custom place on their aspirations, and on healthy inter-racial competition, and of other such causes unfavourable to the dissemination of technical instruction. On the other hand, he has given graphic and comprehensive information as to how the caste system of the people can be utilised in improving workmanship, and enlarging the sphere of labour generally, and how it lends itself to conditions of co-operative work in factories. He has also pointed out what incentive is furnished by the rising standards of life, and the enormous imports of foreign manufactures, for the production of articles of daily use or consumption. Further, he has indicated how the extension of general education, and the growth of Western

notions as to the objective of industrial labour being the common weal of the country, instead of mainly contributing, as it did in former times, to the pride and luxury of the ruling and aristocratic classes, are designed to prepare large communities to burst the bounds of hereditary employment within fixed and orthodox limits and to proceed to the extension and application of the principles of science and art to practical pursuits, or, in other words, for the reception of technical education in its widest and best sense.

Starting from the platform thus prepared for us, I propose in the first place to enlarge upon those conditions of Indian life which will enable us to realise whether, and how far, the habits and wants of her people at the present day demand a supply of such articles as require in their manufacture skilled labour based upon technical instruction. Of the 288,000,000 of people who form the population of the country, it is roughly reckoned that 180,000,000 are agriculturists. If we entirely exclude this great subdivision of her inhabitants from the classification mentioned in the preceding sentence, and regard it as offering no market for manufactures of skilled industry, we still have upwards of 100,000,000 of people, or three times the whole population of the United Kingdom, who might fairly be assumed in varying degrees to take such articles into daily use. In respect of the agricultural population, too, it must be remembered that they afford a vast field for the consumption of rough cotton and woollen fabrics, which are at present supplied to a large extent by hand-loom. This might seem strange to those who have heard of the large cotton spinning and weaving steam factories of India, but that these mills do not compete with the hand-loom to such an extent as to drive the worker at those crude primitive machines out of existence might not unreasonably be assumed to point to the fact, that even in the one industry, which is mistakenly supposed to be fully developed in India, there is enough scope for much further development by means of such technical instruction as might ultimately tend to cheapen the manufactured article, thus enabling it to replace the slow production of the hand-loom. This subject, I must confess, admits of some controversy, and therefore, after contenting myself with the passing allusion I have made to it, I would ask you to revert to the consideration of the wants of the 100,000,000,

which, as we have seen, extend to articles of skilled manufacture.

What do they use every day? Take the humblest household first. You will find there metal pots and pans for cooking purposes, kerosene or mineral oil and matches for light, cotton, bone, or metal buttons, pins, hooks and eyes, needles and thread, which enter into the preparation of the family garments of rough native-made fabrics. Then there are tacks and nails, twine and string, a hammer, and other tools in many houses. All these articles, every one of them, is of foreign make.

Peering into another household, a stage or two upraised in the social scale, you find nearly all the articles common to the daily use of a European working man, most of the culinary utensils, lamps, candle and soap, paper, ink, pen, pencil, not a single one of which is made in India. His house is painted with colour or washes of foreign composition, the woodwork of it is varnished with foreign varnish, his clothes are of European manufacture. One degree higher, again, and four-fifths of the articles you find in the domicile of a peon, a petty schoolmaster or a clerk, and on his own and wife and children's persons, are of foreign make. Then come the households of the large middle class, of the successful and comfortable tradesman, the merchant, and the professional man. There, and in a still greater degree, in the mansions of millionaires and the palaces of princes, the predominating proportion of articles is all of foreign manufacture. I try hard to recall to my mind what particular article I should find of Indian workmanship in places like these last, and I do not see many of that description, from the kitchen and stable to the drawing-room and the hall. Some critics who do not fall in with my views, might point to the furniture. That would make a somewhat important exception if I viewed this considerable part of a household as a superficial observer would, but then he does not remember that, save in the simplest and crudest class of furniture, a good proportion of what is known as local furniture is not native-made at all. The springs of a couch or chair, the lining, the buttons, the threads, the hinges of a cupboard or box, the screws, the nails, the locks, the very tools with which these are put together and formed into shape, are all made abroad. So that what remains is the wood and the labour. That even these contribute their due proportion of profit to the native worker, I doubt. English firms and European

employers in very many instances control the production of the raw material and the labour, and very appropriately take the profit of it, the native's gain being the bare living wages of his daily toil. To this point I shall revert at a later stage of this paper; for the present it is necessary not to lose sight of the main issue, viz., what proportion of the articles in daily use in a household in India is of native make.

Then, again, let us turn to things of daily consumption. Naturally, and thanks to the system of religion and caste, and the observances and customs which are thereby enjoined on the vast bulk of the people, these things are mainly confined to articles of native growth. Wheat, rice, grains and cereals, vegetables and fruit, milk and its products, which form the staple food of large masses, are all supplied by the labour of the agriculturist and the farmer, and as they do not require skilled manipulation, the foreigner has not invaded this sphere of the country's produce and supply. But the entire English, Parsee, Eurasian, and native Christian communities, a fairly large proportion of the sixty millions of the Mahomedan population, and an appreciable portion of certain Hindoo sects on whom there lies no obligation, on the score of religion and custom, either to abstain from flesh or to avoid eatables not cooked in their own kitchens, are consumers of tinned and preserved provisions, and of wines and spirits. It is difficult to form a correct notion of the aggregate of this class, but placing it at the lowest figure, with due regard to the status in life which renders this consumption almost a necessity, there cannot be less than 3,000,000 into whose daily dietary foreign provisions and condiments and drinks are included. Although this is not a large proportion of the population, still it is sufficient to furnish forth a good market. And when we look at this item, not only as regards the amount of money which preserved food carries away from India, but by the light of the waste of raw material, or the diversion into foreign countries of the profit that ought to go into the pockets of the natives, as for instance, in the case of tea, coffee, and condiments, then I contend that the inaptitude of the people of India to betake themselves to industrial pursuits cannot but be regarded as a serious evil, of which the cure can be effected in a great measure, if not wholly, by the inculcation of technical instruction.

We have now before us a picture, in the merest outline, of the demand for manufactured articles which exists in India. The

extent and condition of that demand can be but inadequately realised from the few facts I have given above; still, they are sufficient to show that the needs of the people in this direction are as varied as they are extensive. Let us now examine what are the conditions and the system of the production and supply of these articles, what is their range, and what means there are of remedying the defects and deficiencies of that system; how, in short, India can be to-day regarded from an industrial point of view. The popular but somewhat vague notion which prevails on the point, not only outside of that country, but among some of her well-educated classes, is that she is a huge emporium of industries and a competitor formidable to the great industrial centres of Europe.

To my mind this is a great fallacy, and I shall be surprised if you do not come to the same conclusion after you have heard what I have to say. Let us for a moment trace her industrial history from early times.

India, originally, was even more than in the present a purely agricultural country with village communities, including craftsmen who produced everything required for the village and were paid in kind. With reference to the narrow and elementary wants of her inhabitants in the remote past, she might have been considered an industrial country, although not in the sense in which that term is now understood. There are traces of early invaders, and of foreign trading settlers, who utilised cheap labour and the industrious instincts of the population, and started round the coast, and at points on the rivers and the frontiers, industrial centres. But the profits of these industries even from that date did not reach the people. With the advancement of civilisation, and more or less enduring forms of administration which followed, the village communities fell under the dominion of princes, and village craftsmen of a superior kind found their way into great polytechnical cities, and into the courts of chiefs. There are also early records in European history of a large and valuable export trade from India carried on by Greeks, Phœnicians, and Egyptians, followed by Saracen traders, who brought back such fables of India as we find in the history of Sindbad the Sailor, known to every school boy.

In the middle ages the Western nations of Europe took up this trade, and Portugal, Holland, France, and England struggled for supremacy, each wishing to grasp for itself

he required a piece of ornament different from the ordinary size and style, and there being nothing in any of the imported stock that would suit, it had to be made. Now, there was no one who could undertake the modelling of it, so it had to be carved in wood, from drawings, then moulded, and cast in plaster. Thus the difficulty was overcome, but in an expensive and not very satisfactory manner.

This question might possibly arise—If the industrial arts in Hobart were so behind that a simple architectural form, such as the one mentioned above, could not be modelled there, how was it that carvers skilful enough to undertake the work were obtainable? The answer is this. Hobart was for many years a ship-building centre, consequently there was lucrative employment on figure-heads, fittings, &c., and at the time of which I am writing, some of the old carvers were still resident there.

Many attempts were made at different times and in various ways, to start something that would supply the want of a technical school, and new comers to the beautiful island remarked the absence of any institution for such training. Gradually a feeling was awakened that a technical school, or, at any rate, classes were necessary. Several attempts were made to enable students and apprentices to work at machine and freehand drawing, &c., but very soon these developed into art classes for amateurs, which only lasted a short time. Other efforts equally sincere, were made, but collapsed after a few months. Then the energy of those interested in education was directed into another channel, juvenile exhibitions were started, and every kind of work done by the youth of both sexes was brought together, criticised, and awards were given to encourage them to develop, as far as the slender advantages allowed, their particular gifts for art or handicrafts. By these means the interest of the Tasmanians was gradually awakened, and a general desire grew for a technical school, where arts and crafts could be properly and thoroughly taught. However, nothing was done till about ten or twelve years ago, when the Hon. G. P. Fitz-Gerald, M.H.A., then member for West Hobart, and Alex. Morton, Esq., F.L.S., &c., gave the matter their serious consideration, and with success. A committee was formed and gazetted, the Government provided temporary rooms, voted a sum of money, and the technical education system was established in Tasmania. Classes were held regularly for the study of elementary

science, technical art, building and machine construction, applied mechanics, chemistry, and domestic economy. These were well attended and good work resulted. As the requirements of this young technical school grew, the rooms were found to be far too small, and the Government then had plans prepared for a new one. These being approved, Sir Robert George Crookshank Hamilton, K.C.M.G., &c., then Governor of Tasmania, laid the foundation-stone of the new school, which was opened about five years ago. A short description of the building may not be out of place here. It is a fine and imposing one of brick and stone, two storeys high. In the left wing on the ground floor is a committee-room and secretary's office, class-rooms for drawing, modelling, casting, carpentry and joinery, turning, &c. The other wing on this floor is occupied by the Government Analyst and his staff, and consists of offices, laboratories, and furnace-rooms. On the next floor are class-rooms for the study of machine and building construction, metal working, applied mechanics, veterinary science, experimental chemistry, metallurgy, mineralogy and assaying, laboratories, furnace-rooms for smelting, and a splendid lecture theatre fitted with all the most modern appliances for demonstrations. During the winter season illustrated lectures are given every week on the various subjects taught in the school, and scientific matters of interest and educational value to students. These lectures are so popular that the large theatre is often crowded in every part, temporary seats being provided on the platform and in the passages. When this school was opened many people considered it far too large for the requirements of Hobart for the next twenty-five years at least. This has already been proved to be erroneous, as it is now too small for the work being done there, and in many cases two classes are obliged to share the same room, using it on alternate nights, and any further extension of the work is practically impossible in the present building.

Simultaneously with the growth of the school in Hobart one had been formed in Launceston, the northern city of the island, where there is a fine system of technical education with many students, amongst whom a splendid work is being done.

Schools were also established in some of the country towns, and were very much appreciated, as in some cases students travelled great distances in all weathers to attend them.

This outline of the founding and growth of technical education in Tasmania does not by

any means exhaust all that can be said on the subject. There were many obstacles to overcome. The "technical education party" in the House, the committee, and the instructors, have all had to bear their share of the fight, and the success of their efforts should stimulate all concerned to continue the good work. So far all went well, and it seemed as if the rising generation in Tasmania would have every advantage of studying the *technique* of their particular arts and handicrafts. But the wave of financial depression, which wrought such sad havoc over our island continent, reached Tasmania. The work for technical education, so well begun, and which had already shown such good results, was paralysed to a great extent owing to the Government vote being reduced by at least one half, and progress or development was next to impossible. The country schools were, in many cases, compelled to close, and those in Hobart and Launceston were so crippled by want of funds that at least half their good work was stopped. Salaries were reduced to such an extent that no instructor (even the best paid) could devote more than one-third of his time to the work of the school and many not even that.

The island is full of native ability which only requires thorough training and proper development to spread the name and fame of Tasmania all over the civilised world. The extraordinary beauty of the scenery, and its exquisite colouring, must have a good influence upon the minds of the young Tasmanians, and a love of the beautiful is, to a great extent, part of their birthright.

There is already a large percentage of earnest students, who love to paint the beautiful scenery, and some of them with a great deal of artistic success. This may be taken as a proof of what might be accomplished under more favourable conditions. Why should not technical art schools be made to occupy as important a place in the development of Tasmanian ability as the splendid schools of the "City and Guilds of London" do here?

It is earnestly hoped, that with the return of prosperity to the colony, the Government will vote a sum for technical education, that will enable the committees to extend the valuable work of their schools. We may then hope to see some of the splendid natural resources of the island developed fully, and utilised in all directions.

The beautiful natural fauna and flora of the colony taken as a motif, and rendered in the fine wood or stone, with which Tasmania

abounds, might with distinct artistic advantage be applied to our public and domestic architecture. There is no reason why our decorations should not be as essentially Tasmanian as our beautiful mountain flowers and berries. Before this desirable state can be brought about, it is above all things necessary that students should be taught to know our fauna and flora. I venture to assert that no thinking man or woman will deny that our waratah, native laurel, wattle, eucalyptus, and most of our numerous ferns could be used for applied decoration with as much artistic success as, and infinitely more suitability than the acanthus, lotus, honeysuckle, or papyrus of the ancients. If this were done, all would learn to see and appreciate the beauty a bountiful nature has so lavishly bestowed upon us. Tasmanian architecture would then be worthy of its country, decorative art a living thing, and we should be freed from the bondage of continually re-doing what others have done so much better, because they *went to nature* for inspiration, whereas we, who use their decorations, can only pose as copyists (more or less bad) of forms which are not sacred to us, and have no meaning for our time. It has been wisely said that "He who follows is always behind," and it is neither desirable nor necessary that Tasmanians should be classed amongst the followers, to be content always to use the brains of others, who could never have had a more beautiful material to work upon.

If the Government will study the best interests of the people it represents, we shall have well equipped technical and art schools, where students can learn what to cultivate and what to avoid. Then, with the practical application of native and familiar natural forms to constructive and decorative arts, we might lay the foundation of a school of architecture and decoration worthy of our colony.

The federation of Australasian technical schools for examinations would be a distinct advantage. So far there is an idea prevalent in Tasmania, and, indeed in many other colonies, that South Kensington is the centre to which work should be sent, and from which all certificates must be issued. This is a decided mistake on the part of the governing bodies of Australasian technical schools, and it has obtained such a hold that it will take a great deal of uprooting.

That it is possible for educational institutions to attain a high standard, and yet remain Australian, has been proved by our universities, those of Sydney and Melbourne in particular.



They conduct their own educational course, and so high is their standard, that it is no unusual thing for Australian students, who have failed to get through the examinations necessary for their degrees, to come to one of the old world universities to pass the examination, which they do (without further study) often with honour, usually taking high places. There is no reason why the standard of technical education should be lower than that of our universities, and surely no one is so well fitted to examine the subjects taught in the technical schools (which are necessarily influenced by local surroundings and conditions) as those living in the country and familiar with the requirements of Australian life. All who desire to see students possessing certificates from South Kensington seem to have the idea that a certain number of them will make the recipient as successful as some particularly eminent men who, in London, have gained similar ones. This very prevalent idea is ridiculous on the face of it. The regular attendance at the schools, the association with so many clever fellow students, the daily intercourse with, and advice of the many great masters of arts and crafts at South Kensington, the advantages of libraries, museums, and the many other opportunities of students attending these schools are, I feel sure, much more to do with the forming, training, and making a great or successful man than the intellectual effort required to pass examinations. But it would seem as if many of those directing technical education in Australasia think otherwise. I would like it to be clearly understood that these statements are made solely in the interests of students in our colonies in general and Tasmania in particular. My ideas on this subject are strengthened by the opinions of several eminent artists and others, with whom I have had the pleasure and privilege of discussing the matter. If the committees directing technical education in Tasmania, and elsewhere, feel that certificates issued by local schools are of little value, let them bring about the union of all technical colleges and schools throughout Australasia, with, say, Sydney, N.S.W., as head quarters. Then a universal standard could be arrived at for all subjects taught in common throughout the colonies. In the case of those which bear solely upon the natural products or manufactures of individual colonies, they must be presided over by local committees, and special certificates granted for them.

This short account of the growth of technical

education in Tasmania, will at least, inform those who are interested in that colony (appropriately called "The gem of the southern seas") that there are men doing the best they can, willingly and without payment of any sort, for the benefit of young colonials. I allude to the members of the various committees governing the schools, and more particularly to those gentlemen in Hobart, with whom I have been intimately associated during my connection with the department of technical education in Tasmania.

In conclusion, I would again like to express the hope that the Government and members of Parliament will soon see their way clear to vote such a sum of money for technical education, that the committee will be enabled to carry on their fine work properly, and extend the range of subjects taught in their schools. That being done, there is no need to fear the result. The natural ability of the Tasmanians will ensure success in their studies, given a fair chance to develop their gifts.

The fame of Australasians for excellence in athletic sports on land and water is very generally known and accepted all over the British empire. The qualities of intellectual brightness, pluck, energy, and determination have every opportunity to develop in sport and athletics, hence their achievements in that direction. Those who know colonials well, will not doubt for a moment their success in the cultivation of artistic and mechanical gifts. The opportunity given, we can look forward confidently to the time when Tasmanians will be known far and wide for their fame in science, arts, and handicrafts.

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#### PROGRESS OF TECHNICAL EDUCATION IN NEW BRUNSWICK.

BY PHILIP COX, PH.D.,

Principal of the Grammar School, Chatham, N.B.

A short time since, the Hon. L. J. Tweedie, Provincial Secretary, handed me a circular from Mr. C. A. Duff Miller, the Agent-General for New Brunswick, *re* the International Congress on Technical Education, and the advisability of making a brief report of the progress of such education in New Brunswick to the meeting of the Congress in London on June 15th inst. To me it is a matter for regret that the notice was so brief and my leisure so little that only a short *resumé* can be given.

Though its importance is generally recog-

nised, technical education, as a branch of popular instruction, has been tried only recently and within narrow limits. This apparent neglect is easily explained. In the first place, a large and aggregated population seems necessary for the establishment and growth of such schools; and, in the second place, they are largely the outcome of public interest, being centred in one industry; of manufacturing zeal and competition; or as a means of reviving some decaying business demanding the fostering care of skilled and scientific labour. In New Brunswick, few of these conditions exist. The industries most attractive, as promising the largest and speediest returns, are lumbering and fishing. In these directions Nature is so prolific that the forests, rivers, and sea show no signs of exhaustion, and hence the rut of popular thought is being little turned from the old tracks. Moreover, to procure and prepare for market the products of these two great sources of provincial wealth needs little scientific or technical aid.

It is, too, no easy matter to institute departures from old customs and usages. The founders of our educational institutions thought only of providing academic instruction, an aim subsequently kept in view throughout all the changes the school system has undergone; for it was thought that technical education would be for the few at the expense of the many—a prejudice to be dispelled only by time and the growth of a more enlightened public opinion. Yet the movement has made some progress.

To the University of New Brunswick belongs the honour of applying the opening wedge; for, owing to the rapid development of the canal and railway systems of the Dominion after confederation, surveyors and skilled engineers were in great demand, a want which was partly met by the establishment of a department of Civil Engineering. This affiliated branch, well equipped with all apparatus for carrying on practical field-work, is growing in popularity, and sending out every year a number of well-trained engineers.

The wonderful development of electricity as a motive and illuminating power has been the means of adding another technical branch, that of "The Applied Sciences," to the University. At a large cost, a complete outfit of plant was imported and set up, and a competent electrician engaged. In close touch with the department of chemistry, this institution is meeting a new and increasing demand for skilled labour, and its graduates

find ready and profitable employment as electricians in the Dominion.

In the introduction of technical schools, the city, as before suggested, naturally takes the initiative, for there are found the grouping of population, keenness of competition, and demand for skilled labour. St. John, the great winter port of Canada, can boast of two fine commercial colleges, thoroughly equipped with banks, custom houses, notaries' offices, &c., with every appendage and practical detail of the business that will stamp the education with reality. The graduates are in demand; for the passage from the college to the counting rooms of commercial houses is both easy and natural. A third institution of the kind has lately been established at Fredericton, the capital, and is meeting with success.

This is all that has been so far realised; but what does the future promise? There are signs of the tendency of education towards the practical in life finding a larger and fuller recognition in the common schools system of the province. The curricula of studies, as amended and enlarged from time to time, bear witness to this fact, despite the fears of some that it tends towards materialism in belief. Such, however, confound the means and end. If the simpler elements of craft and labour can be made the means of assisting to develop the child's faculties, and train the mind, hand and eye, to make them stronger and more perfect as organs, instruments, if you will, for directing and performing work, there must result a saving of time and preparatory labour in the passage from the school to the varied workshops of human industry. And why reasoning about and manipulating these rather than abstract quantities in algebra, geometry, and arithmetic, should be more likely to promote belief in materialism is difficult to understand. But, let the result be what it may, the utilitarian theory is forcing itself more and more upon people's attention and must result in radical changes in educational methods. St. John is attempting to grapple with the problem, and a meeting of the Board of Trade was held a few days ago to consider the feasibility of grafting some technical branches upon the public schools of the city. It was largely attended, and many able and carefully-prepared papers on the subject were read and discussed, these papers dealing especially with the relation between technical education and industrial progress, emphasising the improvements likely to be effected in the condition of the operative and

mechanic and the general life and trade of the city. Something will evidently result from this meeting.

Since the opening of the great Canadian wheat-growing and grazing areas of the West, the farmers of the maritime provinces have suffered from competition; and it is beginning to be felt that to be able to hold their own and turn their proximity to the sea-board and English markets to the best advantage, more careful and scientific husbandry is demanded. Hence the agitation in New Brunswick for an agricultural college, affiliated if possible with the university, and where the students may take advantage of certain courses of lectures likely to be helpful to them in their technical studies.

### FRIDAY, 18TH JUNE.

Major-General Sir OWEN TUDOR BURNE, G.C.I.E., in the chair.

The concluding meeting of the Congress was held in the afternoon at three o'clock.

The CHAIRMAN said he should like to thank all those who had assisted to make this Congress a most valuable and useful one. The meetings had been attended by distinguished foreigners and visitors from the provinces. Our Colonial and Indian Empires had also been well represented. He wished also to thank those who had contributed so many able papers. He ventured to think that when the proceedings of the Conference were published they would be found of great value, not only to themselves, but also to the various Governments concerned. He then proposed that the following be appointed to form the Permanent Bureau of the Congress; and that the Central Office of the Congress be in Paris:—

The Duke of Devonshire, K.G., Lord President of the Council, President d'Honneur.  
C. P. Brooks, of the Education Department (United States of America).  
Eugène Rombaut, Inspecteur Général de l'Industrie et de l'Enseignement Industriel et Professionnel, and M. Wauters, Inspecteur-Adjoint de l'Enseignement Industriel et Professionnel (Belgium).  
Felix Martel, Inspecteur Général de l'Instruction Publique;  
P. Jacquemart, Inspecteur Général de l'Enseignement Technique;  
Léo Saignat, Président du Congrès, 1886, 1895;  
Jacques Siegfried, President of the Commercial Section of the Congress, 1895;  
J. Mesureur, President of the Industrial Section of the Congress, 1895; and  
Julien Manès, Directeur de l'Ecole Supérieure de Commerce et d'Industrie à Bordeaux, Secrétaire Général du Congrès, 1895 (France).

Boris Ovsianikoff, Attaché au Ministère de l'Instruction Publique, and  
Gregory Wilenskin, Attaché au Ministère des Finances (Russia).  
Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I., Chairman of Council, Society of Arts;  
Major-General Sir John F. D. Donnelly, K.C.B., Secretary, Science and Art Department;  
Professor William Garnett, Technical Education Board, London County Council;  
Sir Philip Magnus, City and Guilds of London Technical Institute, and Adviser to the London Polytechnic Council;  
Gilbert R. Redgrave, Chief Senior Inspector, Science and Art Department;  
Sir Owen Roberts, D.C.L., Treasurer Soc. of Arts, and Chairman of the London Polytechnic Council; and  
Sir Henry Trueman Wood, M.A., Secretary of the Society of Arts (Great Britain).

The resolution was seconded by M. JACQUEMART, supported by Sir JOHN DONNELLY, and carried unanimously.

Monsieur LÉO SAIGNAT (President of the Congress 1895), speaking in French, said:—Permit me, before the close of this Congress, to thank you in the name of the French delegates for the reception which you have accorded to us. Those of us who know anything of the difficulties involved in the organisation of such a Congress as this, must have been struck with the satisfactory manner in which it has been conducted. This is the fourth International Congress in which I have taken part, and I shall carry back from it an exceedingly pleasant souvenir of my attendance at a Congress which has been devoted to a work of great public utility. May I also be permitted to express my approval and satisfaction at the establishment of a Permanent Bureau, which our Chairman has just proposed? I thank you again for the welcome you have accorded to us. British hospitality was known to us, and we knew that we should be well received, but the greeting and reception which we have experienced has passed all our expectations. We should be glad to think that an early opportunity would present itself to give you in France that welcome which you have so generously given to us here.

M. WAUTERS (one of the Belgian Government delegates), speaking also in French, wished to congratulate the Congress on having adopted the resolution to establish a Permanent Bureau in Paris, but he could not go from the Congress without expressing his thanks to General Sir Owen Tudor Burne, and those who had conducted the Congress, for the kind reception which had been accorded to the foreign delegates. They were happy and proud to be permitted to take part in its useful proceedings, and they were very sensible of the delicate attentions by which

all the members of the Society of Arts had surrounded them. He desired to express to them the wish of M. Myssens, the Minister in Belgium, that the next Congress on Technical Education should meet at Brussels. He had heard that it was probable that it would meet in 1899 at St. Petersburg, and in 1900 in Paris, and he, therefore, continued to hope that it might be possible to select Brussels for the meeting of the Congress next year, when they would only be too pleased to have the opportunity of repaying the kindness and the welcome which they had received in England.

Mr. C. P. BROOKS (American Government delegate), who had arrived from America too late to take any part in the earlier meetings of the Congress, said he had, nevertheless, seen enough of it to feel that their thanks were due to all those gentlemen who had worked so energetically in organising and conducting it.

Sir JOHN DONNELLY, K.C.B., then proposed a vote of thanks to the foreign and colonial visitors to the Conference, and said that we had had many conferences and meetings in England on Technical Instruction, but he thought that the presence of thoroughly qualified gentlemen from abroad gave a wider field for thought, and ought to take the subject away from some of the minor details which are so apt to encumber it. He did not think anything would forward this subject so much as having the presence of men thoroughly qualified to speak on it, and who came with views formed in other countries.

The resolution was seconded by Sir WM. WINDEYER, and carried unanimously.

M. JACQUEMART, acknowledging the resolution on behalf of the foreign delegates, proceeded to say that he was sure he would evoke a unanimous answer from the delegates when he asked them to accept the proposition which he had the honour to make, that a hearty vote of thanks should be given to the Chairman of the Congress, Sir Owen Tudor Burne. Everyone had been able to see with what distinction and amiability he had presided over the debates with which they had been engaged, and the foreign delegates especially were grateful to him for the cordiality of his welcome to them.

The resolution was carried unanimously.

The CHAIRMAN — Messieurs, je désire vous remercier infiniment des bonnes paroles que vous venez de nous adresser. Je vous assure de la part de la Société, qu'en nous honorant de leur présence, nos distingués confrères étrangers ont rendu au Congrès un grand service. Non seulement ils nous ont aidé par leurs excellents discours, mais ils nous ont encouragé pour l'avenir; et, si, de notre part, nous avons été assez heureux d'avoir réussi à rendre agréable leur court séjour à Londres, c'est pour nous un vrai plaisir. Il faut ajouter que le discours lu, hier matin, par M. Siegfried dans la Section Commerciale en "Room B," était un des meilleurs du Congrès.

The proceedings then terminated.

# APPENDIX.

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## I.—List of Officials, Delegates, Committees, &c.

### PRESIDENT.

Duke of Devonshire, K.G., Lord President of the Council.

### VICE-PRESIDENTS.

Rt. Hon. Sir John Eldon Gorst, Q.C., M.P., Vice-President of the Committee of Council on Education.

Monsieur Léo Saignat, Président du Bureau permanent du Congrès ; Delégé de la Société Philomatique de Bordeaux.

### CHAIRMAN.

Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I., Chairman of the Council of the Society of Arts.

### VICE-CHAIRMEN.

His Excellency the American Ambassador.

His Excellency the Belgian Ambassador.

His Excellency the Russian Ambassador.

Thomas John Watney, Master of the Mercers' Company.

General Sir Evelyn Wood, V.C., G.C.B., G.C.M.G., Prime Warden of the Fishmongers' Company.

Rev. Henry Boyd, D.D., Principal, Hertford College, Oxford, and Master of the Drapers' Company.

James M. Garrard, Prime Warden of the Goldsmiths' Company.

Major-General Edward Coysgarne Sim, Master of the Merchant Taylors' Company.

A. S. Bicknell, Master of the Vintners' Company.

John Walter Sugg, Master of the Clothworkers' Company.

W. H. Perkin, LL.D., Ph.D., F.R.S., Master of the Leathersellers' Company.

Jesse Jacob, Master of the Carpenters' Company.

## DELEGATES APPOINTED BY FOREIGN GOVERNMENTS.

### AMERICA.

C. P. Brooks, of the Education Department.

### BELGIUM.

Eugène Rombaut, Inspecteur Général de l'Industrie et de l'Enseignement Industriel et Professionnel.

Dr. O. Pyfferoen, Professeur à l'Université de Gand.

Paul Wauters, Inspecteur-Adjoint de l'Enseignement Industriel et Professionnel.

### FRANCE.

Felix Martel, Inspecteur Général de l'Instruction Publique.

P. Jacquemart, Inspecteur Général de l'Enseignement Technique.

### RUSSIA.

Boris Ovsianikoff, Attaché au Ministère de l'Instruction Publique.

Gregory Wilenskin, Attaché au Ministère des Finances.

## EXECUTIVE COMMITTEE.

Major-General Sir John F. D. Donnelly, K.C.B., Secretary, Science and Art Department (Chairman).

Captain W. de W. Abney, C.B., F.R.S., Vice-Pres. Soc. of Arts.

Sir Stuart Colvin Bayley, K.C.S.I., C.I.E., Mem. Council, Soc. of Arts.

Sir Frederick Bramwell, Bart., D.C.L., F.R.S., Vice-Pres. Soc. of Arts.

Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I., Chairman of Council, Soc. of Arts.

Francis Cobb, Treasurer, Soc. of Arts.

Prof. Banister Fletcher, J.P., D.L., F.R.I.B.A., Carpenters' Company.  
 Sir Douglas Galton, K.C.B., D.C.L., F.R.S., Vice-Pres. Soc. of Arts.  
 Professor William Garnett, Technical Education Board, London County Council.  
 Sir Philip Magnus, City and Guilds of London Technical Institute, and Adviser to the London Polytechnic Council.  
 Monsieur J. Mesureur, President of the Industrial Section of the Congress, 1895.  
 Edward Nash, M.A., LL.D., Clerk to the Merchant Taylors' Company.  
 Sir Walter S. Prideaux, Clerk to the Goldsmiths' Company.  
 Gilbert R. Redgrave, Chief Senior Inspector, Science and Art Department.  
 Sir Owen Roberts, D.C.L., Treasurer, Soc. of Arts, and Chairman of the London Polytechnic Council.  
 Monsieur Jacques Siegfried, President of the Commercial Section of the Congress, 1895.  
 Alexander Siemens, M.Inst.C.E., Mem. Council, Soc. of Arts.  
 Prof. John Millar Thomson, F.R.S., Mem. Council, Soc. of Arts.

#### GENERAL SECRETARY.

Sir Henry Trueman Wood, M.A., Secretary of the Society of Arts.

#### ASSISTANT-SECRETARIES.

Henry B. Wheatley, F.S.A. | E. H. Fishbourne, M.A., LL.B.

#### RECEPTION COMMITTEE.

The Lord Chancellor, Chairman.  
 Sir William Anderson, K.C.B., D.C.L., F.R.S.  
 Sir Steuart Colvin Bayley, K.C.S.I., C.I.E.  
 Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I.  
 Francis Cobb.  
 Hon. Sir Charles Fremantle, K.C.B.  
 Sir Douglas Galton, K.C.B., F.R.S.  
 Sir Stuart Knill, Bart., Alderman.  
 Sir Westby B. Perceval, K.C.M.G.  
 Alexander Siemens.

#### GENERAL COMMITTEE.

Rt. Hon. A. H. D. Acland, M.P.  
 Sir Frederick Abel, Bart., K.C.B., D.C.L., D.Sc., F.R.S., Vice-Pres. Soc. of Arts.  
 Duke of Abercorn, K.G., C.B., Vice-Pres. Soc. of Arts.  
 Captain W. de W. Abney, C.B., F.R.S., Vice-Pres. Soc. of Arts.  
 Sir William Anderson, K.C.B., D.C.L., F.R.S., Vice-Pres. Soc. of Arts.  
 Henry E. Armstrong, Ph.D., F.R.S., Professor of Chemistry, City and Guilds Central Technical College.  
 Lord Armstrong, C.B., D.C.L., LL.D.  
 The Attorney-General, G.C.M.G., Q.C., M.P., Vice-Pres. Soc. of Arts.  
 W. E. Ayrton, F.R.S., Dean and Professor of Applied Physics, City and Guilds Central Technical College.  
 The Lord Balfour of Burleigh.  
 Sir John Wolfe Barry, K.C.B., F.R.S., Mem. Council, Soc. of Arts.  
 Sir Steuart Colvin Bayley, K.C.S.I., C.I.E., Mem. Council, Soc. of Arts.  
 Prof. T. Hudson Beare, B.Sc., F.R.S.E., Professor of Mechanical Engineering at University College, London.  
 E. L. Beckwith, Treasurer, City and Guilds Technical Institute.  
 Lord Belhaven and Stenton, Mem. Council Soc. of Arts.  
 Sir M. M. Bohnaggre, K.C.I.E., M.P.  
 Sir George Birdwood, K.C.I.E., C.S.I., LL.D., M.D., Vice-Pres. Soc. of Arts.  
 C. W. Bourne, M.A., Head Master, King's College School.  
 William Bousfield, Mem. Council, City and Guilds Tech. Inst.  
 Sir Courtenay Boyle, K.C.B., Vice-Pres. Soc. of Arts.  
 Sir Frederick Bramwell, Bart., D.C.L., F.R.S., Vice-Pres. Soc. of Arts.

- George Ledgard Bristow, Mem. Council, Soc. of Arts.  
 The Hon. Sir Gainsford Bruce.  
 Rt. Hon. James Bryce, D.C.L., M.P.  
 J. Willis Bund, Chairman, Worcestershire County Council.  
 Colonel Frederick Cardew, C.M.G., Governor of Sierra Leone, representing the West African Colonies.  
 Michael Carteighe, Soc. of Arts Exam. Committee.  
 R. Brudenell Carter, F.R.C.S., Mem. Council, Soc. of Arts.  
 Sir Gilbert Thomas Carter, K.C.M.G., late Governor of Lagos, representing the West African Colonies.  
 Count della Catena, C.M.G., Chief Secretary of Malta, representing Malta.  
 H. W. Christmas, Consul-General for Servia.  
 Sir George Hayter Chubb, Soc. of Arts Exam. Committee.  
 Lieut.-General the Hon. Sir Andrew Clarke, G.C.M.G., Agent-General for Victoria.  
 Ernest Clarke, M.A., Secretary, Royal Agricultural Society  
 Francis Cobb, Treasurer, Soc. of Arts.  
 Alan S. Cole, Science and Art Department.  
 Charles Critchett, B.A., Soc. of Arts Exam. Committee.  
 Rt. Hon. Viscount Cross, G.C.B., Vice-Pres. Soc. of Arts.  
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 Major-General Charles A. Sim.  
 Higson Simpson, Town Clerk (Technical Education Committee), West Hartlepool.  
 William Slingo.  
 Miss Helen M. Smith, B.A., Lady Superintendent, Borough Polytechnic Institute, S.E.  
 Alderman Thomas Snape, J.P., Chairman, Technical Education Committee (Lancashire County  
     Council), Preston.  
 Frank Spooner, Organising Secretary, Technical Education Committee, Bedfordshire County  
     Council.  
 Henry Spooner, Polytechnic School of Engineering, Regent-street, W.  
 Rev. S. Alfred Steinthal, Chairman of Council, Union of Lancashire and Cheshire Institutes,  
     Manchester.  
 Rev. J. Stewart, College of Preceptors.  
 W. Augustus Steward.  
 H. R. Summers, Secretary, Machinery Users' Association, and Assistant-Secretary, Paper  
     Makers' Association.  
 W. E. Sumpner, D.Sc. Principal, Municipal Technical School, Birmingham.  
 Councillor George Sutherland, Technical Education Committee, Derby.  
 Léonard Suttle, M.A., Société Philomatique de Bordeaux.  
 Howard Swan.  
 Edwin Tate, J.P., Chairman, Battersea Polytechnic Institute, S.W.  
 R. S. Taylor, Head Master, Raine's Boys' School, Cannon-street-road, E.  
 Frau von Thielen, Vienna.  
 A. A. Thomas, B.A., National Union of Teachers, London.  
 John Thomas.  
 Caleb Thornber, Mayor of Burnley.  
 Leonard Temple Thorne, Ph.D., F.I.C.  
 Mrs. Thorne.  
 C. E. Thornycroft, Technical Education Committee (Cheshire County Council), Crewe.  
 W. J. Thorrowgood, Polytechnic, Regent-street, W.  
 Lord Thring, K.C.B., County Councils Association.  
 Councillor A. J. Tillyard, M.A., Technical Education Committee (County Council), Cam-  
     bridge.  
 Alderman A. S. Tomson, J.P., Mayor of Coventry, and Chairman of Technical Education Com-  
     mittee.  
 Rev. Norman Trewby, M.A., Bancroft's School, Essex.  
 Thomas Turner, Director of Technical Instruction, Staffordshire County Council, Stafford.  
 G. S. Turpin, Technical School, Swansea.  
 J. Unwin, Technical Education Committee (Lancashire County Council), Preston.  
 Sir Edmund Verney, Bart., Winslow, Bucks.  
 R. Waddington, Vice-President, National Union of Teachers, London.  
 Miss Wade, Royal School of Art Needlework, South Kensington, S.W.  
 R. Hedger Wallace, Examiner in Agriculture to the Education Department, Melbourne, In-  
     specter of Agricultural Colleges, Victoria.  
 Dr. Walmsley, Principal, Northampton Institute, Clerkenwell, E.C.  
 Miss L. Edna Walter, B.Sc.

Alderman Ward, Technical Education Committee, Portsmouth.  
 Richard P. Ward, Organising Secretary, Technical Education Committee (Cheshire County Council), Crewe.  
 Sir Thomas Wardle, Leek, Staffs.  
 Countess of Warwick.  
 Sidney Webb, LL.B., Chairman, Technical Education Board, London County Council.  
 Sidney H. Wells, Principal, Polytechnic Institute, Battersea, S.W.  
 Professor J. Wertheimer, B.A., B.Sc., Principal, Merchant Venturers' Technical College, Bristol,  
 Hon. Secretary, Association of Technical Institutes.  
 F. West, Vice-Chairman, Technical Education Committee (Essex County Council), Chelmsford.  
 Miss A. Wheeler, Lady Superintendent, Northampton Institute, Clerkenwell, E.C.  
 F. A. White.  
 H. J. White, National Union of Teachers, London.  
 Henry J. White, Bristol.  
 J. M. White, Dundee.  
 Edward E. Whitfield, M.A.  
 Miss Whittey, Northern Polytechnic, Holloway, N.  
 Councillor Wilkinson, County Borough Council, Ripon, Yorks.  
 Frederick Wilkinson, Director and Secretary for Technical Education, Bolton, Lancs.  
 Miss Wilkinson.  
 Charles Williams, Secretary, Technical Education Committee, Newcastle-on-Tyne.  
 John Williams, Artistic Crafts Department, Northampton Institute, Clerkenwell, E.C.  
 W. E. Willink, M.A., Chairman, Technical Education Committee, Liverpool.  
 W. Wilson, M.A., Principal, Royal Technical Institute, Salford  
 John Wiltshire, F.C.S., Organising Secretary, Technical Education Committee, County Council  
 Hereford.  
 Prof. T. Winter, M.A., University College of North Wales, Bangor.  
 Miss Winthrop.  
 Prof. Otto N. Witt, Ph.D. (Berlin).  
 Rev. L. C. Wood, C.A., Technical Education Committee (Lancashire County Council), Preston.  
 C. J. Woodward, Municipal Technical School, Birmingham.  
 John Woolman, Technical Education Committee, Watford.  
 Dr. R. Wormell, M.A. (Head Master, Central Foundation Schools of London), College of  
 Preceptors.  
 A. W. Worthington, Technical Education Committee, Worcester.  
 Thomas D. Wright.  
 Councillor E. Young, Technical Education Committee, Portsmouth.

## II.—Amounts contributed by the City Companies towards the Expenses of the Congress.

	£	s.	d.
The Mercers' Company .....	26	5	0
The Fishmongers' Company .....	100	0	0*
The Drapers' Company .....	100	0	0*
The Goldsmiths' Company .....	100	0	0*
The Merchant Taylors' Company .....	52	10	0
The Vintners' Company .....	10	10	0
The Clothworkers' Company .....	100	0	0*
The Leathersellers' Company .....	10	10	0
The Carpenters' Company .....	50	0	0

\* Half this amount was paid, and the other half promised if required.



## III.—Permanent Bureau of the Congress.

[*Elected Friday, 18th June, 1897.*]

The DUKE OF DEVONSHIRE, K.G., Président d'Honneur.

C. P. BROOKS	{	United States of America.	BORIS OVSIANIKOFF	}	Russia.
EUGENE ROMBAUT	{		GREGORY WILENSKIN	}	
PAUL WAUTERS	}	Belgium.	Sir OWEN TUDOR BURNE, G.C.I.E.		
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JULIEN MANÈS	}		Sir OWEN ROBERTS, M.A., D.C.L.		
			Sir HENRY TRUEMAN WOOD	}	















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